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ABSTRACT

This thesis examines the analysis, design, development, implementation, and evaluation of an instructional development project addressing hotel fireguards. Systematic techniques were applied to produce a session to train the appropriate hotel employees to qualify as fireguards. The portion of training represented in this report is the sprinkler module. Formative development techniques refined the session contents and produced encouraging results with members of the target population. The trainees were enabled to pass the standard examination administered by the City of New York. The appendices include content information to be taught, suggested teaching methods, pretests and posttests with answers, final tests, suggestions for trainees taking the fire guard examination, visuals for duplication/display, and a 21-item bibliography. (KC)

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NEW YORK INSTITUTE OF TECHNOLOGY

announces the

Final Examination

of

James Mason

for the degree of

MASTER OF SCIENCE

in

TRAINING AND LEARNING TECHNOLOGY

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Fireguard Training for Hotel Employees: Sprinkler Module

Abstract

This is a report and examination of the analysis, design, development, implementation and evaluation of an instructional development project addressing hotel fireguards. The designer applied systematic techniques to produce a session to train the appropriate hotel employees to qualify as fireguards. The portion of training represented in this document is the sprinkler module. Formative development techniques refined the session contents and produced encouraging results with members of the target population. The trainees were enabled to pass the standard examination administered by the City of New York.

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Old Westbury, NY

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FIREGUARD TRAINING FOR HOTEL EMPLOYEES:
SPRINKLER MODULE

a

THESIS/PROJECT

by

JAMES MASON

submitted to the faculty of the
School of Media and Arts

of

NEW YORK INSTITUTE OF TECHNOLOGY

in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

in

TRAINING AND LEARNING TECHNOLOGY

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FIREGUARD TRAINING
TRAINING FOR HOTEL EMPLOYEES
At The
HALLORAN HOUSE
And
CONGRESS HOTELS

by

James Mason

M.P.S., August, 1985 New York Institute of Technology

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A Thesis

submitted to The Faculty of the

School of Media and Arts

of The New York Institute of Technology in partial satisfaction of the requirements for the degree of

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CHAPTER 1

INTRODUCTION

Orientation

In the field of fire protection there are two types of building occupancies that present very specific and unique life hazards. These dangers manifest themselves when conditions are present due to the daily activities carried on in the occupancy. The activities include; in one instance, those of the public assembly type of classification; and, in the other instance, the transient hotel building. In both cases, the dangers are magnified because of the life hazard associated with human behavior rather than those caused by a structual design or fire hazard.

In December of 1975, New York City was the scene of a fire in a public assembly occupancy. It would cause both the New York City Building Department and the Fire Department to take another look at the fire protection provided in these occupancies. In this fire, seven people died, not because of the fire or design hazards present, but because of the behavior of the people in the occupancy. The disaster became known as the Blue Angel Fire because that was the name of the supper club in which the fire occurred. The important lesson learned from this fire was that the reactions and behavior of people in a public assembly

occupancy can never be predicted. In this instance, there was a highly sophisticated and educated group of people. While there was a period of thirty minutes before the fire became serious, they did not recognize the dangerous conditions that were developing and the need for evacuation.

The transient hotel is another occupancy that in recent years has produced many fire diasters with a high loss of human life. When studying the hotel fires of the past twenty years, there are many instances of a large number of fatalities as a result of the behavior of the occupants. Some of the better known diasters in the United States include:

- the MGM Grand fire, Las Vegas, Nevada
- the Las Vegas Hilton fire, Las Vegas, Nevada
- the Dupont Plaza fire, Puerto Rico

In hotels, because of the transient nature of the hotel guests and their unfamiliarity with their surroundings, human behavior is an important factor in any consideration of fire protection. There is another factor that has contributed to the dangers involved in hotel fires. This is the tendency toward high-rise construction in the design of these buildings. High Rise buildings provide an increased number of people that must be provided for in an emergency or fire. Because of this factor these buildings require pre-fire safety plans and evacuation

procedures that are unique to the specific building. In other words, each building provides an environment different from one another, but with some common characteristics. The common characteristics can provide a need for training certain hotel employees. Key personnel can be given instruction in such fire protection systems and emergency procedures as:

- Building Fire Alarm Systems
- Elevator Recall Systems
- Standpipe and Sprinkler Systems
- Smoke and Heat Detectors
- Portable Fire Extinguishers and Their Use
- Evacuation Procedures
- Fire Hazard Control

Purpose of the Project

The designer has been sucessful in instituting fireguard training programs at the following hotels in the New York area:

- Halloran House Hotel
- Barbizon Hotel
- White Plains Hotel

In addition, the designer has been active in firesafety training in Chicago, Illinois. In the present project fireguard training will be presented at the Congress Hotel in that city. The city of Chicago, is at an earlier stage of high-rise fire

safety development than New York City. The designer has had the approval of the Chicago Fire Department in instituting the fireguard training at the Congress Hotel.

This project will enable fireguards of hotels and motels and public assembly occupancies to pass the certficate of fitness exams required by local fire departments. In addition, the trainees will possess the knowledge required to function in this capacity. The training in both types of occupancy spaces is interchangeable with some modification.

Definition of Terms

The modules in the project contain many technical terms, names, and references. To make reading the project an easier task and also to provide a guide for an instructor unfamiliar with the specific terms, a definition of terms is provided:

Accelerator - a quick opening device used in Dry Pipe sprinkler systems. The accelerator unbalances the air differential in the system dry pipe valve causing it to open quicker.

Automatic Wet Pipe Sprinkler System - the system contains water under pressure at all times and is connected to a water supply so that a fused sprinkler head will immediately discharge a water spray in that area and actuate an alarm.

Cabaret - a place of public assembly where more than seventy five people gather for the consumption of food and drink, accompanied by musical

entertainment. (New York City Building Code)

Carbon Dioxide - a gas resulting from the complete oxidation of a fuel. The gas stimulates the rate of breathing of a person and accelerates the inhalation of toxic gases and irritants to the respiratory and circulatory systems.

Carbon Monoxide - a gas resulting from the uncontrolled burning of fire. In the uncontrolled burning of an accidental fire, the availability of oxygen is never ideal and some of the carbon is incompletely oxidized to form carbon monoxide.

Certificate of Fitness - a certificate issued by the Fire Department after an applicant has been tested and sucessfully passed an exam for a specific competence.(New York City Fire Prevention Code, Chapter 19 of the Municipal Code of the City of New York).

Classes of Fire - any one of the four classes of fire. They include:

Class A - Ordinary Combustibles
Class B - Flammable Liquids
Class C - Live Electrical Fires
Class D - Combustible Metal Fires

Combustible Liquids - liquids which give off a flammable vapor at or above 100 degrees Farenheit are referred to as combustible liquids. (Fire Protection Handbook, 15th. Edition, National Fire Protection Association, Quincy, Ma.).

Dry Chemical Extinguishing Agent - an extinguishing agent used in portable fire extinguishers and fixed pipe extinguishing systems to extinguish Class B or Class C fires. The agent can be either of two types:

1 - Ordinary Dry-Chemical
2 - Multi-Purpose Dry Chemical

Dry Powder Extinguishing Agents - any one of the commercially prepared dry powders sold for use on Class D Metal Fires. Specific powders are used on specific metals.

Elevator Recall System - (also known as Fireman's Service System) The elevators are controlled by the use of a special key activated circuit. Upon receipt of a fire alarm, elevator cars can be immediately recalled to the lobby level and kept there for Fire Department use. This prevents use of the elevator car by building occupants, preventing them from being trapped in the elevator car during a fire. After the arrival of the Fire Department, the cars can be used by members of the department to reach the upper floors of the building. The elevator is under the control of the operator inside the elevator car.

Fireguard - Fireguards are required to be on duty whenever the following occupancies are open to the public:

1. Public Assembly Occupancies.
2. Hotels and Motels over seventy five feet in height, until the requirements of New York City Local Law #16 is complied with.
3. In Chicago, IL a fireguard is required to be on duty at the Front Desk in all hotels and motels.

Fire Department Connection - known as a siamese connection. It is located outside of the building, usually in the front of the building but can be on the side of a corner building. Under fire conditions, public water supplies or gravity tank supplies may not provide water at sufficient pressures for effective discharge and distribution. It also functions as a back up supply of water for the system. The connection enables the Fire Department to connect Engine Pumpers to the system and supply water from an additional source.

Fire Safety Plan - the plan describes the procedures to be followed in the event of a fire or emergency in the building. It provides the rules for for a safe, orderly evacuation of an area or building by its occupants in the event of a fire or emergency. The Fire Safety Plan also lists the available fire appliances and alarm system as may be provided. It also establishes the procedures to be followed for notifying the Fire Department of the alarm. The controlling or extinguishment of the fire, and the safeguarding of human life which includes the evacuation of building occupants included in the plan.

Fire Triangle - in fire suppression theory and training, fire is depicted as a triangle, with each leg of the triangle reresenting a component of fire. The components are heat, oxygen, and fuel. Each individual element is mutually dependent on the other two for combustion. Without any one of the three elements fire cannot exist, and each of the three must be in the proper proportion for fire to occur.

Flammable Liquid - liquids that give off a vapor <u>below 100 degrees Farenheit</u> and vapor pressures not exceeding 40 psia at 100 degrees Farenheit.

Flashover - a process during a fire where all the surfaces and objects involved in the process are heated to their ignition temperature and flame breaks out simultaneously over the entire surface.

Flash Point - approximately the lowest temperature at which the vapor of the liquid is just sufficient to produce a flammable mixture at the lower limit of flammability. It is the lowest temperature at which the liquid will flash and produce a flame.

Gravity Tank - a source of water supply for a sprinkler system, usually a secondary source of water. The gravity tank should be of sufficient capacity and elevation (height) to provide adequate

water pressure for the system.

Heat - is the energy necessary to increase the temperature of a fuel to a point where sufficient vapors are given off for ignition to occur.

Liquids - fluids with a pressure not exceeding 40 psi absolute temperature.

Life Safety - usually refers to the protection provided for people. It can be designed into a building structure. Two factors important to life safety include:

1. alerting occupants to the existance of a fire.
2. evacuation or escape from the fire.

Life safety design requires attention to who will be using the building and what they will be doing most of the time. After addressing this factor, consideration is then given to communication, protection of escape routes and temporary areas of refuge or safety.

Local Law # 16 - a New York City local law that applies to all high rise hotel buildings over seventy five feet in height. The law requires installation of extensive fire protection systems in existing buildings of this type. In the interim period until installation is complete, certified fireguards are required to patrol the building whenever it is open to the public.

Local Law # 41 - a New York City local law that applies to all Places of Public Assembly. The law provides for the protection against fire and panic by requiring such safeguards as:

- fireguards on duty whenever the occupancy is open to the public.
- emergency lighting throughout the corridors and fire stairwells.
- an operating fire alarm system.
- daily inspections of the premises with the results of the inspections recorded.

- a Fire Drill Conductor is required to be on the staff of management to train employees in fire drill procedures and evacuation.
- cabarets require the installation of a sprinkler system in designated areas of the occupancy.

Motor Gong Alarm - a hydraulically operated sprinkler water flow alarm. The alarm is a local alarm used to alert the personnel in a sprinklered building. Also, somebody passing the building on the outside would be alerted that water is flowing in the system.

Pressure Tank - used in a sprinkler system in two different situations:

- where an adequate volume of water can be supplied, but where the pressure is not sufficient to serve the sprinkler system.
- in tall buildings where the public water pressure is too low for effective distribution from the highest sprinkler heads in the building. Pressure tanks may be used to supply the sprinkler system heads until the public fire department can supply water through Fire Department Connections located on the outside of the building.

Public Assembly Occupancy - an enclosed space or room in which seventy five or more persons gather for religous, recreational, educational, political, or social purposes or for the comsumption of food or drink or similar group activities. The definition excludes such places in dwelling units or an outdoor space in which two hundred or more persons gather for any of the above reasons. (New York City Building Code, 1960, Chapter 26 of the Adminstrative Code).

- **Assumptions**

The instructional program for the training of fireguards

contains a number of assumptions about the trainees and the environment in which they will perform their duties.

1. that the trainees after being certified will perform their assigned duties in the event of a fire or emergency. After the training the fireguards will be monitored during the scheduled fire drills to check that there is a transfer of training in performing their fireguard duties.
2. that the trainees will not have any physical handicaps that would prevent them from performing their duties.
3. that the trainees taking the instruction can read and write in the English language.
4. that the management of the organization will support the activities of the fireguards.

Limitations

The training program has been developed for employees of the hotel industry and public assembly types of building occupancies in New York City and Chicago. It may not prove effective for other industries or locations without appropriate modification. The audience that the instruction is limited to is students with a service industry type of work background. Employees with this type of work experience will be more familiar with the problems encountered in these

environments.

Methods and Procedures

For this project, the instructional content is determined by the certificate of fitness examination. The test is a measure of the general subjects in which the Fire Department requires the fireguard applicants to be proficient. The topics are standardized and they will be intergrated with the guidelines issued by the local fire deparments. The guidelines can be found in Appendix C. For example, the trainees in the sprinkler module will be instructed in the different systems, but where there are specific requirements for a locale these specific rules will be intergrated into the training.

Summary

In this chapter, the reader has been introduced to the recent disasters that have prompted the passage of the laws regulating fire safety in high rise hotels and public assembly occupancies. Specifically, New York City laws have been reviewed and their relationship to fireguard training defined.

Also included in the present chapter is a section defining the different terms used in this project. It can serve as a guide to a future instructor of fire safty training that might be unfamiliar with the present course content.

CHAPTER 2

Analysis

Introduction

Analysis is a technique used for separating an entity into its constituent elements. It is considered to be the first critical event of designing and developing a training program. Without performing this step designers or developers can not ensure that training will solve problems or will meet the needs of an organization.

Needs Analysis

Determining the need for fireguard training in a hotel or public assembly occupancy can be decided upon by two different approaches. In the first situation, fireguard training would be mandated by law as per local fire department rules. The second strategy would apply in localities where fireguard training is not required by local building department or fire ordances. In this situation, a fire drill would provide an effective method for assessing how efficient the building or occupant employees could provide evacuation of the structure. In the present project, the fireguard training will be given in New York City and Chicago. In both areas the training requirement for fireguards is mandated by local fire department rules.

Job Task Analysis

The instructional goal of the fireguard training in this project will be for the trainees to pass an examination administered by the New York City Fire Department or the Chicago Fire Department. After passing this requirement, the trainee will be issued a certficate of fitness that enables the trainee to perform the duties of a fireguard. The testing consists of twenty multiple choice questions. A score of seventy percent is required for passing. An analysis of the questions resulted in the subject material being classified into the table found in Appendix B. The table is the basis for the subject content that will be covered in the instructional program.

Target Population Analysis

For hotels, fireguards are generally drawn from security departments and the engineering staff of the building. In the training given at the two sites for the present project, this general rule applied. An additional requirement in Chicago was that a member of the on duty front desk staff of the hotel is required to be a certfied fireguard. In New York City, it was found that evacuation procedures are more efficient when front desk personnel are available for recalling the building elevators via the manual key operated firemens' service system. Permission was obtained from the Chicago Fire Department to have front desk

personnel recall the elevators during an evacuation procedure at the Congress Hotel.

In public assembly occupancies as a general rule, fireguards are selected for training from employees who function in the waiter category. These employees may present a problem in the selection process because the trainees may not possess the entry behaviors needed for the instruction. In the present training, all of the applicants whose job duties were in the banquet department qualified and passed the exam.

Organizational Constraints

For the planned project, it was found that the lecture method in combination with audio/visual media was the most appropriate strategy for instruction. The designer had all the necessary audio/visual equipment for the classes that were given in New York City. Because of the distance and traveling involved, the designer did not have equipment available at the Chicago site. The practice at the hotel in Chicago is to rent audio/visual equipment when needed. This was done and the equipment was available when the class was given.

Definition of the Instructional Program

Dick and Carey (1985) state that any selection of instructional goals must be done in terms of the following

questions:

1. are there sufficient people to complete this job?
2. is there sufficient time to complete this job?
3. are these goals acceptable to those who must approve this instructional effort?
4. will the development of this instruction solve the problem which led to the need for it?

There are additional questions that the instructional designer should examine when putting together an instructional project. Once a training need has been established and time and resources are available, the designer should then determine if the instructional content is stable enough to warrant the cost of developing it. As a general rule, if it will be out of date in six months, then extensive instructional development is not warranted. Another concern is the availability of learners. The instructional design process involves the use of these individuals, to try out the instruction. If the designer cannot get access to the appropriate number of learners, it will be impossible to implement the total design process. An adequate number of learners should be available to receive the instruction. If there are not enough learners for the one-on-one trials, small group trials, and field testing; the validity of the training should be reconsidered. Another consideration in the instructional design process should be the designer's expertise in the area in which the instruction will be developed.

In the present project the questions asked of the training situation were all answered with positive responses. Besides being mandated by law, there was sufficient time, people, and organizational support for the instructional project.

The analysis of the fireguard certificate of fitness exam and the sequencing of objectives resulted in the following six classes of subject content which were the six instructional modules:

1. Classes and types of fires.
2. Portable fire extinguishers.
3. Sprinkler systems, including fixed pipe extinguishing systems.
4. Fire reporting systems.
5. Fire hazards.
6. Life safety hazards.

Review of Literature and Survey of Existing Courses and Materials

A literature review was conducted by Techsearch at the New York Institute of Technology library focusing on high rise fire safety, and fires in public assembly occupancies. The search produced a total of fifty three articles focusing on fires in these types of occupancies. Of the total, five articles

concentrated on training of employees in high rise buildings. In this literature, focus was on fire protection systems, fire protection appliances, and fire reporting and evacuation procedures. The majority of the literaure pertaining to fire safety in both high-rise buildings and public assembly occupancies concentrate on building design and fire codes. As stated above, there is a neglect in the design of the building or occupancy and the many human behavior problems encountered at fires in these types of structures.

The designer compared the existing courses with the instructional need that generated the instruction program as described in this project. The designer found eight courses that were related to the instructional need for fireguard training of employees.

1. An Examination and Analysis of the Dynamics of Human Behavior in the Fire Incident at the Roosevelt Hotel on April 24, 1979, (John L. Bryan, Oct. 1979).

This professional analysis focuses on the specific topics of fire safety, evacuating-transporting, and smoke. The hotel fire occurred in Washington, D.C. and provides a scenario of the problems encountered during an evacuation of a building of this type.

2. Controlling High-Rise Fires (Glen C. Stanford, July 25, 1983).

Adequate sprinkler coverage provides the best physical protection in high-rise buildings. Automatic sprinklers help control and extinguish fire and minimice smoke levels. Many local governments throughout the country require sprinkler systems in new high-rise buildings. In existing structures the laws are more lenient. Compared to the risk and cost of potential damage without sprinklers, the installation of sprinkler systems in new and existing buildings is inexpensive. The article reviews fire protection systems which in combination with sprinkler systems can augment the manual fire fighting efforts in these buildings. The topics include hose stations on the floors of the building, roof outlets to be used to prevent the fire from spreading to adjacent buildings, and sprinkler water flow alarms to provide continual alarm protection for the occupancy.

3. Fire Safety (Alan T. Stutts, Dec. 1984/Jan. 1985).

Prior to booking any accomodation, covention and meeting planners should investigate the extent that a hotel, restaurant, or conference facility can protect its guests from fire. This procedure should be an automatic part ofthe site-selection process. This magazine article provides fire safety questions which the organization reserving the facility should have answered before making the decision to use the occupancy.

4. High-Rise Fire Traps, (Charles Koegler, July 1980).

Developments in materials and building design have enabled industry to erect the modern skyscraper. These high-rise fire traps have eliminated many safety methods that had been sucessfully been used in the design of previous structures. Older buildings were safer for the occupants as they were built floor by floor with each level a separate unit. The building design of newer high-rise structures can pose a threat to tenents from both heat and smoke. The article recommends increasing fire safety by instituting early warning systems. These systems would include ionization-type smoke detectors. In addition, the use of detectors as a control device for other building systems is offered as a strategy for building managers to increase fire safety. The proper locations for placing smoke detectors in high-rise building is also reviewed.

5. High-Rise Fire Safety - An Overview (Raymond R. Neal, Sept./Oct. 1974).

In this article, an example is presented of how a typical fire in a high-rise building might be mishandled. Advice is given on how to reduce the liklihood of fire and minimize the damage if one starts. The author advocates the education of tennants to assist in the elimination of fire hazards, immediate notification of the fire department and building management, and education of building employees in the proper use of building

fire protection devices.

6. Life Safety in High-Rise Buildings (Patti Shosteck, 1976).

Topics covered in this informative article from the professional journal, Job Safety and Health include: foamed plastic padded furniture, carpeting, draperies and furniture coverings made from synthetic materials. Other subjects of value in planning for life safety in high-rise buildings are unpredictable human behavior in emergencies, and lack of employee preparedness. A check list of strategies that should be considered is provided for use in establishing a fire safety plan for the building.

7. Non-evacuation in Compartmented Fire Resistive Buildings Can Save Lives and It makes Sense (J.N. MacDonald, April 1985).

This article outlines the topics covered in the conference sponsored by the National Bureau Standards, and the National Conference of States on building codes and standards. Of interest are specific topics of evacuation and compartmentalization. In this article, several fires in compartmented fire resistive building are examined.

8. Property Management Guide to Fire Protection (Ellsworth O. Stevens, 1974).

In this professional journal of property managers, advice is given on what actions a manager can take to prevent fires or what plan should be followed after a fire has started. The article focuses on instuction of residents in how to evacuate a building and conducting fire drills.

Related Theory

According to the domains of learning described by Gagne' (1985), the instructional goal is classified as an intellectual skill. There are four types of intellectual skills: discrimination, concepts, rules, and problem solving. The students will need to determine the difference between classes and types of fires, types of fire extinguishers, and types of sprinkler systems and their components. They will also be required to apply rules for fire extinguishers, fire hazards, and life hazards. As fireguards they will need to utilize problem solving skills, for example, selecting the proper fire extinguisher for a specific fire or determining what floors to evacuate during a fire in a high rise hotel.

Plan for Design and Development Effort

The designer used time lines to indicate the events and activities of developing the training program from the beginning to the end. The process was started on November 1,1988 and

completed on June 1,1988. The time line diagram may be found in Appendix A.

The designer also used the program evaluation and review technique (PERT) to plan the overall development of the fireguard training program described in this project. Levin and Kirkpatrick (1975) stated that " the PERT technique is a method of minimizing production delays, interruptions, and conflicts; of coordinating and synchronizing the various parts of the overall job; and of expediting the completion of projects " (p.489). Pert also helped the designer to complete the project on time. The project planning documents are shown in Appendix A.

Summary

The designer through an analysis of training needs identified the instructional goal. It is identified as an instructional skill. The trainees when taking the instructional program will utilize intellectual skills (discriminations, concepts, rules, and problem solving) in the learning situation.

The program was planned to be given in a classroom setting using the lecture method to deliver the instruction in conjunction with the appropriate audio/visual material. The designer surveyed the existing courses and reviewed the professional literature. The plan for the design and development effort was based on time lines and a PERT chart.

CHAPTER 3

DESIGN

Introduction

Design is the process of conducting an instructional task analysis to determine the knowledge and skills the trainees would use when performing the job. The designer then identified the instructional objectives. These written statements define when, what, and how well the students must perform. The designer also specified the entry behaviors and sequenced objectives. Learning activities were prepared for each task. Test and evaluation systems were planned.

Instructional Task Analysis

After the instructional goal was established and classified according to the domains of learning in the analysis phase, the designer conducted an instructional task analysis to specify the major steps of learning that students will be doing when they are performing. These steps were then arranged in a logical order. The output from this process provides a broad overview of the completed task from beginning to end. It also provides the framework that the designer needed to identify the subtasks.

The major instructional tasks were divided into six steps. Each step was broken down into its subordinate skills. The

technique used to identify the subordinate skills was to ask the question, "What does the student need to know to learn each step?". The completed task analysis is shown in Appendix B. The task analysis shows that the training content contains information that is classed as knowledge. This is due to the fact that the objective of the training is to pass an examination given by the local fire department. After the applicant is certified this knowledge will need to transferred into skills. This could be accomplished during fire drills and in-service training.

Instructional Objectives

The instructional objectives were derived from the instructional goal. The instructional objectives are called the terminal performance objectives (TPOs).

Mager (1984) stated that "An objective is a description of a performance you want learners to be able to exhibit before you consider them competent. An objective describes the intended result of instruction, rather than the process of instruction itself"(p.3).

Mager suggested that the format of an objective should include those characteristics which satisfy the following:

Performance - What should the learner be able to do?

Conditions - Under what conditions do you want the learners to do it?

Criterion - How well must it be done?

The terminal performance objectives of the sprinkler module which will be the instructional lesson delivered for this project are the following:

1. After the instruction, the student will describe the operation of a dry pipe valve without the aid of notes with 100% accuracy.
2. Given the color codes, the student will match the proper color to the proper system siamese verbally with 100% accuracy.
3. Given a written test, the student will answer questions describing an Outside Stem & Yoke (OSY) Valve with 100% accuracy.
4. After the instruction, the student will describe the operation of an automatic wet-pipe system sprinkler head with 100% accuracy.
5. After the instruction, the trainee will describe verbally the three sources of sprinkler system water supply in high rise buildings with 100% accuracy.
6. Given the instruction, the student will verbally describe the operation of an exhaustor and an accellerator with 100% accuracy.
7. Given a written test, the student will describe Fire

Department Regulations pertaining to sprinkler systems with 70% accuracy.

8. Given a written test, the student will answer questions about wet-pipe sprinkler system components with 70% accuracy.
9. Given a written test, the student will answer questions about dry-pipe sprinkler system components with 70% accuracy.
10. Given actual sprinkler heads of different types on display, the student will point to the appropriate sprinkler head when asked to by the instructor with 70% accuracy.
11. Given a written test, the student will answer questions pertaining to inspection procedures of sprinkler systems with 70% accuracy.
12. After the instruction, the trainees will describe the temperature ranges of sprinkler heads with 100% accuracy.

Entry Behaviors Defined

Entry behaviors are a key component in the design process, Dick & Carey,1985. Based on an analysis of the target population, the entry behaviors required for the students receiving the instruction in this project are the following:

1. The student must be able to read and write in the English language.
2. The student must have a basic knowledge of mechanical principals and chemical theory. The critrion test will accomplished by a one on one interview with the prospective trainees.

Additional requirements placed on the trainees by management are:

3. The students are selected by the hotel management to receive the fireguard training.
4. The trainee must attend all sessions of the instruction.

Group and Sequence Objectives

After the objectives were written, the designer studied them for regrouping. The objectives written all pertain to the module on sprinkler systems. It was not necessary to group or resequence the objectives as they were written specifically in the proper order for the module being delivered for this project.

Gagne's steps of instruction are also related to the present instructional activities. According to Gagne', in choosing media, the instructional designer has first to select the kind of language medium that will be able to perform all of the functions required in establishing the events called for by instructional theory to support learning processes. Verbal communications are

usually accompanied by actual objects or representations of the objects in the form of pictures or diagrams, for example, transparencies or slides. A primary reason for the use of objects in instruction is that they are directly involved in the performance expected as a result of learning.

A second reason for the use of objects or pictures in instruction is that they are the means by which the learner can acquire visual images that are presumed to be a very important type of memory encoding and storage, (Gagne',1985). Image encoding is a prominent feature in the instructional use of:

1. motion pictures
2. slide-type presentations
3. instructional TV programs

Thus, the instructional content and the instructional methods used in the present sprinkler module are encouraging the events of instruction and resultant learning that occurs.

Learning Activities Specification

Relating each performance objective to the respective learning activity resulted in the creation of Table 1 to display the relationship.

Table 1

Learning Activity Instructional Strategy Matrix

Learning Activity	Content	Instructional Strategy	Media
1 -	Dry Pipe Valve	Video Supported Lecture	Video
2 -	Siamese Colr Codes	Lecture	Realia
3 -	OSY Valve	Video Supported Lecture	1. Video 2. Trans-parency
4 -	Sprinkler Head Operation	Video Supported Lecture	1. Video 2. Trans-parencies
5 -	Sprk. Sys. Water Supplies	Lecture	Realia
6.-	Sprk. Sys.Exh. and Accelerator	Video & Transparency Supported Lecture	1. Video 2. Trans-parency
7.-	F.D. Sprinkler Sys. Regulations	Lecture	Realia
8.-	Wet Pipe System Components	Video & Transparency Supported Lecture	1. Video 2. Trans-parency
9.-	Dry Pipe System Components	Video & Transparency Supported Lecture	1. Video 2. Trans-parency
10.-	Sprinkler Heads	Video & Model, Lecture & Demon-stration	1. Video 2. Sprk. Heads
11.-	Inspection Procedures	Lecture	Realia
12.-	Sprinkler Head Temperature Ranges	Lecture	Realia

Assessment System Specification

The assessment system that the designer will use will be the pretest and post test. The rationale of the assessment system is to check if learning has taken place with the instruction. By a comparison of the the pretest and the post test scores, the instructor can determine if learning was accomplished as learning can be considered as behavior change which would result in higher scores on the post test exam. Assignment of grades on the exams will be based on a passing grade of seventy percent. Seventy percent represents scoring correctly seven out of ten questions on the tests. The basis for assigning seventy percent as the passing mark was that it is the passing grade for the New York Fire Department certificate of fitness exam for which trainees are being prepared.

A pretest was used to measure skills that were going to be taught in the instructional module. The pretest helps to determine how much prior knowledge the students have of what is going to be presented as the subject content.

Evaluation System Specification

The evaluation systems used in this project are formative evaluation and summative evaluation.

Formative Evaluation

The designer conducted the formative evaluation during the

development of the instruction. It is used to improve the quality and effectiveness of the instruction. There are three basic phases of formative evaluation. The phases are one on one evaluation, small group evaluation, and a field trial (Dick and Carey,1985).

Summative Evaluation

The purpose of summative evaluation is to describe the effectiveness and feasibility of the proposed instructional program (Dick and Carey). In addition, the summative evaluation as described by Kirkpatrick consists of four levels: reaction, learning, behavior, and results/impact.

Review of the Existing Materials

Media Selection

In reviewing the existing materials that were available, the designer selected three commercially prepared materials for use with the sprinkler module. They include two VHS video tapes which have sprinkler systems as the subject focus. The third media selected was a package of overhead transparencies entitled IFSTA 200, "Sprinklers". All were purchased from the International Fire Service Training Association of Oklahoma State University. Primarily, selection was made on the credentials of the source. All may be found listed in the bibliography. All were

purchased from the International Fire Service Training Association of Oklahoma State University. The designer also reviewed the existing printed materials for possible inclusion in the instructional, materials. As none of the printed materials were appropriate for the fireguard training, the designer did not select any for use.

Summary

The designer conducted an instructional task analysis to determine the major skills and subordinate skills needed to perform the necessary tasks. The designer then identified the instructional objectives, entry behaviors, and sequenced the objectives; specified learning activities and planned a test and evaluation system.

For the delivery of the sprinkler module of the training program, the designer selected commercially prepared VHS tapes and transparencies for use as an aid to delivering delivering the instruction.

CHAPTER 4

DEVELOPMENT

Introduction

In this chapter, the focus will be on the module of the project that will be developed for presentation to fireguard trainees. The subject material will focus on sprinkler systems. After the development of the lesson, classes were given in both New York City and Chicago, ILL. Both sites should provide adequate opportunity for formative development and testing of the content and presentation. The procedure followed in the development of the learning activity, for example, the audio/visual media that will be used for the presentation will be included in this present chapter

Learning Activity Development Scheme

In this particular module, the instruction will be developed for groups of up to twenty five students. Audio/visual material that will be used for this module include :

- International Fire Service Training Association overhead transparencies from the IFSTA series 200, entitled "SPRINKLERS".
- Fire Service Training VHS Tape, Firefighter 1 Series, entitled "SPRINKLERS".

- Fire Service Training VHS Tape, Firefighter 2 and 3 series.

Learning Activity Review

The sprinkler module will be designed to cover a one and one half hour training session. The training session can be part part of a multi-module instructional program or it can be presented alone as a separate module. The session comprises ninety minutes of clock time which can be divided according to the time schedule shown in Table 2 .

Table 2

Schedule

Event	Length
Administer Pretest	10 Min.
Presentation of transparencies and lecture minutes	20 Min.
Presentation of first VHS Tape	15 Min
Presentation of second VHS Tape	20 Min.
Questions and review of material	15 Min.
Adminstering the post test and reaction sheet	10 Min.

The session will begin with administering the pretest for which five minutes of the total of ninety minutes has been reserved. At this time, the session is continued with a presentation of transparencies relating to sprinkler systems, utilizing the lecture method. Copies of the transparencies used are shown in Appendix H of the present project. The presentation with the overhead projector should serve to accomplish the nine events of instruction which are:

1. gaining attention.
2. informing learners of the training objectives.
3. stimulating recall of prior learning.
4. presenting the stimulus.
5. providing learning guidance.
6. eliciting performance.
7. providing feedback.
8. assessing performance.
9. enhancing retention and transfer.

The events of instruction, according to Gagne' can be considered events that facilitate learning. The instructor can select and arrange events of instruction so that they support the internal processes of learning. The nine steps of the events of instruction and the theory underlying their use in the instructional process are detailed in the following paragraphs.

1)- Gaining Attention - (Gagne´),

There are two kinds of attention or in other words, two separate meaning´s for the term. The first is a general alerting function by means of which the learners posture and general muscular tone assume a state of readiness to receive stimulation. The learners may also turn their heads and direct their senses so as to be in line with the source of stimulation. Alerting can be accomplished by many different means, for example, by sounds, by light changes, and in general by sudden changes in stimulation. Instructors can use various techniques such as introduction of novel stimuli or changes in voice pitch to bring about alertness on the part of the students.

The second meaning of attention is selective perception. The stimulation delivered to the learner is arranged to give emphasis to the distinctive features of the presentation. In other words, to the features to be stored and processed in the short - term memory. This function can be accomplished in different ways, for example, in a printed text, the words and phrases may be underlined, italicized, or printed in bold type. Pictures may use heavy outlining, arrows, circled portions, or different colors in order to highlight the features to be selectively perceived. Instructional designers should be aware of the variety of ways that can be used to give selective emphasis to stimulus presentations for learning. The information that is processed in

learning is a selected set from the total stimulation presented to the learner. Using the appropriate techniques for gaining attention is an important early step in laying the foundation of what is learned.

By opening the module with the use of transparencies the event of gaining attention is accomplished in this module. The transparencies are a commercially prepared set and they use color to emphasize components, portions of sprinkler systems, and key points to remember in the presentation. The transparencies also use the technique of highlighting and using cutaway views in the pictures to focus on important points of sprinkler systems.

2)- Informing the Learners of the Training Objectives

The object of this step is to communicate to the learner an expectancy of the performance to be achieved as a result of the learning. The primary effect of providing learners with an expectancy of the learning outcome is to enable them to match their own performance with a class of performance they expect to be correct, thus the reinforcement in the form of informative feedback, confirms the learners' expectancy.

This step is accomplished in the module by the use of a transparency that the instructor can produce to state the objective of the module. An example of a transparency that could be produced would be the following:

- After completing this instructional module, the student will be able to:
  1. Differentiate and describe an automatic wet-pipe and a dry-pipe sprinkler system.
  2. Describe the function of the components of a automatic wet - pipe sprinkler system.
  3. Answer correctly, seventy five per cent of the multiple choice questions of the post test pertaining to inspectional procedures of sprinkler systems.

3)- Stimulating Recall of Prior Learning

Two different kinds of verbal directions can be used to induce retrieval of previously learned entities, and each may be preferable in particular instances. When a relatively simple concept definition is being learned, it may be sufficient for directions to stimulate recognition of what has previously been learned. For example, in connection with the learning of a definition of "Sodium", the directions might say "you remember what sodium looks like; you also remember what a metal is".

When more complex rules are being acquired, it may be desirable for directions to require recall or reinstatement of the subordinate skills. Thus, if the learner is acquiring a rule about the hypotenuse of a right triangle, it may be desirable to require the recall of subordinate rules by asking the learner to

draw a right triangle and then asking the question, "Which sides enclose the right angle?" The learning of a new rule can proceed satisfactorily with the assurance that the necessary subordinate concepts are accessible in the working memory. This event of instruction is an important step in the sprinkler system instruction because the module requires the recall of many technical concepts. Concepts that are not in everyday use are required to be recalled during the instruction. These concepts include electrical and hydraulic theories and theories of physics that are not in everyday use and need to be brought into the learners consciousness. To facilitate learning during the instruction the instructor can make use of the analogy to stimulate recall of concepts.

4)- Presenting the Stimulus

This particular stage in the events of instruction must take into account the way in which the instruction is going to be delivered. Not only is the choice of media influenced by the learning situation but other aspects of instructional design are affected by the anticipated delivery system for instruction.

In the range of instructional delivery methods, there is instruction that may be delivered directly from a medium such as the printed page to the individual learner. At the other end of the range are delivery methods such as watching television

programs, and interacting with computer - based programs. Once an instructor is introduced into the learning situation, several different systems of delivery become possible. In planning instructional delivery, the different formats used for learning that should be considered are the following:

Tutoring - this arrangement comprises a one to one interaction.

Small group - this arrangement can be small group with recitation or a small group with discussion. A small group is considered to number up to eight students.

Large group - this method can also use recitation and very often uses the method of lecturing. Lecturing is a system characterized by one way communication from the instructor to the students. A lecture session may also be modified to allow for scheduled periods of recitation or questioning.

This event of instruction, presenting the stimulus has important applications not only to the sprinkler module but also to the entire program of fireguard training. It is important for the instructor of this training to be aware of the different techniques that the trainer can use to present the stimulus. Of

equal importance is for the trainer to know when to use the different methods in order to attain maximum effectiveness of the trainees learning. As different situations that call for fireguard training can range from individual, to small group, to large audiences, presenting the stimulus is an important step for the instructor to carefully design into the instruction. In the present instruction, the instructor made use of the lecture method in combination with VHS tapes and overhead transparencies as audio/media.

5)- Providing Learning Guidance

In this phase of learning, the instruction consists of the encoding process that transforms the information into the form in which it will be stored in long term memory. The guidance of learning may utilize the technique of presenting actual schemes for encoding such as tables,graphs, or pictures or it may only suggest such schemes. Other times, learning guidance may consist of verbal communications to the learner which may be given the general name of verbal directions. Their function is not instruction, but telling the learner what to do at any given time.

Two aspects of learning guidance affect the encoding process. One aspect consists in the stimulation of recall of necessary prerequisites and other supportive materials from the learners

long term memory. This process involves retrieval from the long term memory to the working or short term memory. The second function of learning guidance is the presentation or suggestion of an encoding scheme which affects the form in which the new learned material will be stored in the long term memory. The instructor in th sprinkler module presentation used the technique of asking questions to provide learning guidance to the trainees.

6)- Eliciting Performance

The elicitation of learner performance that reflects the new learned capability is a natural event in the instructional process. For example, the learner who acquires a psychomotor skill will readily exhibit the performance required to demonstrate the skill. The principal of requiring a performance in one or more instances is equally applicable to other kinds of learning outcomes, for example, cognitive strategies, attitudes, and information learning. Performances to exhibit what has been learned provide evidence to the instructor and learner that learning has attained its objective. In addition to the exhibition of a performance in one or two instances following learning, performance of the learner may be appraised in a more formal way by means of a test. A test usually is designed to appraise the learning of several instructional objectives over an extended period of time. It therefore, gives an indication of the

retention of what has been learned as well as the immediate outcome of instruction. While tests have several important functions in programs of instruction,they are not substitutes for the elicitation of performance that occurs as the endpoint of learning.

In the sprinkler module the instructor gives a post test which is used as an indicator of what has been learned or in terms of events of instruction, elicitating performance. In the instructional process, it could also be arranged to have different types of sprinkler heads available so that the trainees can be asked questions about them. As an example, the sprinkler heads could be set up on a table or desk and the instructor can ask the fireguard trainee to point out a specific type of sprinkler head.

7)- Providing Feedback

Closely associated with the elicitation of performance that exhibits the new learning is the provision of feedback to the learner. In a typical example, the learner exhibits a performance that reflects the newly learned capability. Then the learner is advised of sucess or failure. This does not mean that words such as; right, wrong,correct,wrong or incorrect have to be used.In the classroom, a correct performance may be indicated by the trainer going on to the next point in the lesson, Other subtle

cues may be employed such as a nod, smile, or glance. However, the learner must have previously learned that these events signify a correct performance. In most cases, this can be assumed under most circumstances, since such knowledge is usually learned early in life. For some learning outcomes, such as motor skills, and cognitive strategies, feedback must convey or state the degree to which the learners performance approaches some standard.

Feedback need not always come from the external situation but may come from concepts or rules previously acquired and recalled by the learner. In a learning module such as the one being developed, because it is a technical subject, the learner will be depending on previously acquired or recalled concepts or rules for feedback. Because sprinkler systems are systems with components, many different concepts and rules will apply to them. For example, system components will operate on hydraulic, electrical, and mechanical principals in their operation. As the instruction progresses the learner will be mentally providing feedback as different concepts and principles are presented. The technical nature of the sprinkler module implies that feedback must convey a degree to which the trainees performance meets some standard. This can be incorporated into the post test by requiring a certain percentage of the questions to be answered correctly

8)- Assessing Performance

The performance that accompanies the learning of a new capability is simply a verification that learning has occurred. The performance indicates only that some reasonable probability that the capability has been stored in long term memory. To insure that the storage of the newly learned knowledge has taken place, the instructor should require additional instances of performance. Assessing performance in this manner is usually accomplished by administering a test. A test, in this instance, serves the following functions:

1. establishing that the newly learned capability has reasonable stability.
2. providing additional practice that serves-what has been learned.

The post test included with the sprinkler module will satisfy the above functions of a test. In the first instance, the stabilty shown by the trainee will provide feedback to the instructor that the information has been stored in long term memory. The second provision of providing additional practice will focus on what has been learned and will provide feedback to the student. To insure this step, sprinkler heads were placed on a demonstration table and the trainee was asked questions about the heads. When asked a question, the student was required to

point to the proper sprinkler head.

9) Enhancing Retention and Transfer

There are two factors that are important to the newly learned information:

1. Will the information be retained over long periods of time?
2. Will the information be capable of being employed as a performance in new situations, with new problems?

Increased amounts of practice is a fairly dependable factor for affecting the amount of retention. This seems to apply to the remembering of verbal information, intellectual skills, and motor skills. The required practice for remembering the information learned in the sprinkler module can be provided by the use of handouts given by the instructor. The sprinkler module makes use of handouts showing both types of sprinkler systems and also the operation of a standard sprinkler head.

Learning Activity Review

The sprinkler module utilized two VHS trainig tapes and one set of overhead transparencies entitled"Sprinkler Systems". The first training tape that is used is named "Sprinkler Systems" and focuses on the basic components of an automatic wet pipe system

and a dry - pipe system. The second tape is titled "Sprinkler Systems, Inspection and Testing". The focus of this tape is more technical than the first basic system tape. In order to evaluate the tapes, they were presented to the engineering department personnel of the Halloran House Hotel for their evaluation and comment as to the technical accuracy and completeness of the tape. Both tapes were received favorably by the engineering staff who were taking the fireguard training. The second VHS tape might be slightly too technical for some fireguard audiences, but certain portions of the tape are useful to show system components and their operation. It was decided that if the instructor doesn't want to use the complete tape, portions of the tape could be used to demonstrate subject material, e.g. the tape could be used to demonstrate the operation of a sprinkler control valve. The designer reviewed the audio/visual materials used in the sprinkler model for grammar, spelling, and punctuation.

Summary

In the development phase of the instruction, it was decided that of the modules for fireguard training, the sprinkler module would be developed for the project. The formative evaluation would be accomplished by a training session at the Halloran House Hotel in New York City. After this class and evaluation of the materials, the training session would be given at the Congress

Hotel in Chicago,Illinois.

In this chapter, the designer scheduled and designed into the module the time allotted to subject presentation, audio visuals, and questions and review of module content. The designer also reviewed the nine events of instruction and how they were accomplished in this lesson.

In the learning activity review, the results of the Halloran House engineering staff evaluation for the audio/visual materials were commented on and an alternative offered for the second VHS tape, if it was found to be too technical for the trainee.

CHAPTER 5

IMPLEMENTATION

Introduction

The implementation phase began after the lesson development of Chapter 4. Included in the implementation process was the pretest, post test, and the reaction questionaire. All of these materials were evaluated before the Halloran House Hotel presentation. The tests were designed to measure whether the students achieved the learning objectives of the instruction. The reaction sheet was also part of the formative evaluation structured to give the designer feedback from the fireguard trainees about the lesson.

Materials for Implementation Reproduced

As a result of the formative evaluation process, some of the questions of the pre-test were rewritten. The designer found that the first draft of the test contained technical language that was above the entry behaviors of the prospective trainees. After the necessary revisions, twenty five pre-tests and post tests were produced for use in the Halloran House class. Both the pre-test and posttest may be found in Appendix E.

Instructional Delivery

The first fireguard training class was given at the Halloran House Hotel in New York City on November 30, 1987. This class presentation was part of the formative evaluation of the program. As a result of this class, adjustments were made in the subject presentation. The second fireguard class was scheduled to be given in Chicago, Illinois on December 17, 1987.

After discussions with the management of Halloran House, the time allotted to the fireguard training program was six hours. This resulted in the sprinkler module being given one and one/half hours of class time. In a training project of this type, many organizational and employee problems should be anticipated. Examples of the problems would include scheduling of employees from their normal duties, and manpower coverage while the class is in session. Consideration has to be given to vacations, sick leave, and overlapping shifts where payment of overtime might be a necessity.

One of the function rooms at the Halloran House was reserved for the training session. The instructor asked the management to have the tables arranged chevron style for the class. The designer arrived at the room, one hour before the scheduled class in order to arrange the room environment. This amount of time was needed for setting up the audio/visual equipment. For the sprinkler module, the equipment included an overhead projector,

VHS recorder and a television. Extra tables and electrical extension cords were provided. The designer had arranged for management to provide coffee for the students. The first trainees started to arrive approximately twenty minutes before the scheduled start of class which was ten o'clock.

Sixteen hotel employees from different job classifications attended the class. Included in the class were employees with job titles such as engineering technician, front desk personnel, accounting office clerks, secretaries, and security department officers.

For the instructional delivery of the sprinkler module, the instructor chose the modified lecture technique as the teaching method. The modifications include the use of questioning, demonstration, and audio visual media to augment the lecture method of instruction. Augmenting the lecture method results in a more stimulating environment for learning to take place. In addition to presenting the information the modified lecture results in more interaction between between instructor and the students. There is greater opportunity for learning to take place, as opposed to the lecture method where the student assumes a passive role. The instructor found that more flexibility is provided for arranging the events of instruction. The instructor can schedule external events to facilitate internal processes

that take place in learning. The use of transparencies, and VHS tapes were helpful in accomplishing these events of instruction.

The modified instructional method is based on the following concept. Davis and Alexander (1977) claim that the lecture is a technique in which an oral presentation is made by the teacher on a particular subject. As a technique, it is one way communication in which the teacher gives information and the students are passive receivers of that information. However, when the lecture method is augmented by examples, questions, demonstrations, and visual presentations, the learning environment is enhanced in that the internal processes are facilitated. The modifications require the student to do more active listening than in the traditional lecture method.

The most important consideration in deciding upon the type of instructional method to use is the type of learning objective being taught. It is recognized that there are three domains of student objectives and they include:

- Knowledge
- Attitudes
- Skills

In addition to the type of objective, there are other important considerations in choosing an instructional method. It is important for the instructor to meet the following audience needs:

1. encourage student - instructor interaction.
2. involve students in the instruction process.
3. adjust to different levels of student abilities.
4. provide immediate student feedback.
5. accomodate large numbers of students.

Audio/visual materials can augment teaching methods and can make the instruction more stimulating. Examples of an enhanced lecture which utilizes audio/visual materials can include the following techniques:

- overhead transparencies and slides can be used in a lecture.
- a videotape can be used to begin a group discussion.

The instructor designer utilized the five step method in preparing the lesson plan to be used as a guide in the delivery of instruction. The lesson plan can be found in Appendix D. As the lesson plan is a guide in the instruction process, the instructor will review the five step method.

1. **The Motivation Step** - (Getting the trainees ready to learn).

The students attention is focused on the information or skill that is to be learned. The student is made aware of what is to be learned and why it is important to learn it. The instruction should be structured so that the trainee can

associate each new idea or task to be learned with something they already know. Instructor activities during this step would include :

- asking questions.
- citing examples.
- review of previous lessons.
- stating lesson objectives.
- conducting diagnostic quizzes.
- reviewing the benefits of achieving the lesson objectives.

2. The Presentation Step -

In this step new ideas or skills are presented or demonstrated to the trainees. Actual information or knowledge is given. The most effective method of instruction is to present small segments of information and then have the trainees involved in application of the information that was presented. If the information only involves knowledge or non - skill, questions should be asked to determine the effectiveness of the instruction.

3. The Application Step -

In the instructional process this step might be considered the most critical in the five step lesson plan. The student is given the opportunity to apply the information or skill that has

been presented or demonstrated. Methods for providing the practice required by the students include the suggestions:

1. List questions to use for feedback to evaluate the students comprehension as they practice.
2. Provide repeated practice time for the student to reinforce the newly acquired skill.
3. Supervise the trainees closely by checking their work and correcting errors.

List projects and special problems that could be used to employ the new skill or information.

4. The Evaluation Step -

The purpose of the evaluation step is to determine if the students can achieve the intended learning outcome of the lesson, the behavioral objectives. The evaluation step provides information to the students and the instructor whether instruction on this particular lesson is complete. The step can also provide an indication if additional instruction is needed. Different evaluation techniques are used for motor skills and cognitive lessons. For the present instructional module, questions related to the sprinkler head models were used. The fireguard trainees were also given a post test.

5. The Conclusion Step -

Following the evaluation step, the instructor should bring the lesson to a logical conclusion. Suggestions for achieving the closing of a lesson include:

- a summary of the important points covered in the lesson.
- an evaluation of the overall performance of the class.
- the instructor stating what the next assignment will be.
- give motivational information on the next assignment to the students.

The following matrix illustrates which techniques were used in each of the five steps of the sprinkler lesson plan to accomplish the events of instruction:

Table 3

Lesson Steps and Instruction Events

Step	Technique	Event of Instruction
1. - Motivation	a. pre - test b. transparencies c. state objectives	a. Gaining attention
2. - Presentaion	a. lecture b. transparencies c. VHS tape #1 d. VHS tape #2	a. stimulating recall b. presenting the stimulus
3. - Application	a. lecture b. questions	a. providing learning b. guidance (encoding)
4. - Evaluation	a. questions	a. eliciting performance b. providing feedback c. assessing performance
5. - Conclusion	a. lecture b. review	a. enhancing retention and transfer

Data Collection

The instructor began the class with the trainees taking the pretest and concluded with the posttest. The data collected from the exams are presented in Appendix G. Each student exam sheet was assigned a number and the grade appears next to the number.

Summary

In this chapter, the designer/instructor described the technique that was used to deliver the instruction. As the teaching method, the modified lecture technique was chosen, taking advantage of the use of audio/visual media. A review of the five step instruction process was conducted in the chapter. After reviewing the instruction process the instructor/designer related the steps to the events of instruction. All of the data that was collected in the evaluation phases of the classes, given at both hotels may be found in Appendix G.

Chapter 6

Evaluation

Introduction

Evaluation is a process of providing information about a proposed instructional program. An instructional program is inclined to be more effective when it is the result of tryouts with one or more sets of typical learners. During the design of instruction it is not unusual for mistakes and omissions to occur. The procedures used in trying out and testing the effectiveness of products of instructional design are called formative evaluation. It consists of collecting data and information, revising uncovered problems and inconsistencies, with the result of improved instruction.

Another form of evaluation is called summative evaluation. It may be defined as the design, collection, and interpretation of data and information for a given instruction for the purpose of determining the value or worth of that instruction, Dick and Carey(1985). The evaluation systems used in this thesis/project are formative evaluation and summative evaluation.

Formative Evaluation

The designer/instructor conducted the formative evaluation during the development of instruction. It can be defined as the

determination of the effectiveness of instructional materials. There are three basic phases of formative evaluation. The phases are: one on one or clinical evaluation, small group evaluation, and field trial or pilot testing.

1. One on One Trials

The purpose of this phase is to identify and remove the most obvious errors in the instruction, and to obtain initial reactions to the instructional content from students.

The designer worked with individual students to obtain data to revise the materials. One student at a time was picked from the target population, and the designer worked individually with each of them. The trainee should be typical of those found in the target population. When the target group is homogeneous, this will not be a problem. When the target population is made up of varied skills and background, however, the designer should consider including one from each subgroup in the one on one trial. The designer took this into consideration when choosing the trainees for the one on one trial. Trainees were chosen form the different departments in a hotel. The number of fireguard trainees that is normally selected for one on one trials is two to four students.

The types of information that the designer looked for during the one on one trials are the following:

1. Are the trainees able to perform all of the skills

identified in the group and sequence objectives ?

2. Is there any instruction that should be added to the instruction ?
3. Does the instructional material provide the proper vocabulary, descriptive clarity, examples, and feedback information for the learner ?
4. Are the instructional objectives clearly stated for the students ?
5. Is the time alloted to complete the material adequate ?
6. Are the test instructions, vocabulary, and test questions clear to the students taking the instruction ?

These questions are adopted from types of questions used in one on one evaluation, suggested by, Dick and Carey (1985).

The designer worked with two subject matter specialists for a review of materials prior to the one on one trials. The lecture content used in the sprinkler module was given to New York City Fire Academy instructors for their imput as to technical correctness. The technical experts were Captain Michael Mina and Captain Martin Connelly of the New York City Fire Academy staff. In the case of the commercially prepared sprinkler system VHS tapes and overhead transparencies, it will be assumed

that validation of the materials was ensured by the producer of the material.

2. Small Group Trials

There are two primary purposes for the small group evaluation. The first is to determine the effectiveness of changes made following the one on one evaluation and to identify any remaining learning problems that students may have. The second purpose is to determine if learners can use the instruction without interaction with the instructor. The learners who participate in the small group trials should be as representative of the target population as possible. Six employees of the Halloran House Hotel were selected by the designer for the small group trials.

The same materials reviewed in the one on one trials will be used. The same types of information described in the one on one trials was recorded by the designer. Using small group trials enabled the designer to observe and compare the reaction of students to the materials as a group. An advantage to the designer is the prevention of assuming that all students respond in the same manner. Additionally, the designer was able to observe and respond to any of the usual group dynamics taking place.

3. Field Trial

In this final stage of formative evaluation, the instructor

attempts to use a learning situation that closely resembles that intended for the ultimate use of the instructional materials. The purpose of the field trial is to determine if the changes made after the small group stage were effective and if the instruction can be used in the environment for which it was intended.

The number of students that participate in the field trial phase should be approximately thirty students. Because the instructor did not have access to this many prospective trainees for the field trial at the Halloran House Hotel, six employees other than those used for the small group trial participated in the field trial.

The focus of the field trial is on the testing of procedures required to be used in the "real world" environment. In the present project, the field trial took place with the instruction given at the Halloran House Hotel. This was an advantage to the designer/instructor because it provided a real world environment for the testing of the instructional program. The same types of information is collected in the field trial as in the other phases of the formative evaluation, e.g. one on one and small group trials.

Data Collection

The designer collected the following data during the

formative evaluation:

1. Comments made by the participants during the one on one and small group trials about the instructional materials For example, the following comment was recorded:
   - the evaluators thought the technical language used by the designer in the test questions too difficult for the trainees. The question vocabulary was modified to match the entry level behavior of the trainees.
2. Comments and reactions of the subject matter experts (SME) about the sprinkler system instructional content. Specifically the comments concerned technical content that needed to be revised to incorporate new technology in sprinkler system design.
3. Test data collected from the pretest, and post test during the Halloran House Hotel instruction which was the field trial. The pretest and post test scores may be found in Appendix G.
4. Data from the reaction questionaire used for the Halloran House presentation. Comments from the reaction questionaire included such reactions as:
   - more time should be given to the instruction.
   - the instruction was very informative.
   - all employees of the hotels should recive the fireguard training.

- the training would have practical off the job application for the trainees.

5. more time was required for the student to complete the materials during the one on one, and small group trials. The designer modified the time so that the participants had more time to complete the evaluations.

Data collection which includes the pretest and post test for both the Congress Hotel and the Halloran House Hotel may be found in Appendix G.

Summative Evaluation

The purpose of summative evaluation is to describe the effectiveness and feasibility of the proposed instructional program, (Dick and Carey, 1985). In addition, according to Kirkpatrick (1975, 1987), summative evaluation consists of four levels: reaction, learning, behavior, and results/impact.

Level 1 - Reaction

According to (Friedman and Yarbrough, 1985), the most common method of evaluating a training program is to assess the students reaction to the program. The designer used the reaction sheet to gather information about the students feelings toward the instructional program.

The Reaction Sheet questionaire can be found in Appendix F.

Level 2 Learning

The designer used the testing method of pretest, and post test to measure the students achievement of the instructional objectives.

Level 3 Behavior

This level was used for measuring the students actual performance after the instructional program. In the case of fireguards in hotels and public assembly occupancies, this level of achievement can be accomplished within three months. Fire drills are required to be held every ninety days on all work shifts in New York City. Scheduled fire drills were held and new fireguards were rated on their performance of their duties. All demonstrated acceptable performance of the fireguard function.

Level 4 Results/impact

In safety training such as fireguard training, the return on investment in the training effort is produced as intangible results. Advantages of instituting an in - house training program for fireguards can include the following semi - tangible and intangible results.

Table 4

(S) = Semi - tangible

(I) = Intangible

(S) - In certain localities, the organization will be complying with local ordinances.

(S) - It will enable the building to obtain a more favorable insurance premium from the insurer for fire insurance.

(I) - Having an in - house fire safety training program provides a marketing strategy to be used by hotels.

(I) - An in-house training program will provide an environment of security to the clients of hotels and public assembly occupancies.

(S) - The training program will aid the organization in complying with government OSHA regulations for providing a safe work environment for their employees.

Data Analysis Requirement - Types of data that was collected for the summative evaluation include the folowing:

1. Pretest scores.
2. Post test scores.
3. Reaction sheet comments. Attitude measurement of the students toward the instructional procedures and delivery.

Halloran House pretest and post test scores from the sprinkler

module include the following:

Table 5

Sprinkler Module Pretest Scores

N = 16

# 1 - 20%	# 9 - 50%
# 2 - 60%	# 10 - 50%
# 3 - 50%	# 11 - 60%
# 4 - 30%	# 12 - 40%
# 5 - 30%	# 13 - 20%
# 6 - 40%	# 14 - 50%
# 7 - 60%	# 15 - 50%
# 8 - 40%	# 16 - 40%

Table 6

Halloran House Posttest Scores

N = 16

# 1 - 80%	# 9 - 75%
# 2 - 80%	# 10 - 80%
# 3 - 100%	# 11 - 90%
# 4 - 70%	# 12 - 100%
# 5 - 100%	# 13 - 70%
# 6 - 70%	# 14 - 80%
# 7 - 90%	# 15 - 80%
# 8 - 70%	# 16 - 80%

Both pretest and post test scores from the Halloran House Hotel and the Congress Hotel may be found in Appendix G.

Reliabilty and Validity

Reliabilty and validity refer to different aspects of the training. Reliability refers to the consistency of the criteria measures. Validity, on the other hand, refers to the degree to which materials are appropriate for what needs to be measured or taught.

The materials used in this project, (pre-test and post test) appear to be reliable and valid. The materials are valid if they produce the same results everytime. In both instances of the fireguard training the pretest was an indicator of the trainee entry behavior's. The post test was also a valid evaluation of the learning that took place during the instruction. This claim is supported by the students passing the fire department certificate of fitness exam.

In this project, validity of the instructional content and materials (VHS tapes) was addressed by using subject matter experts (SME's). After a review of the materials by the fire academy instructors, they concluded that the materials were appropriate for teaching the objectives of the program.

Reliability was addressed by using the results obtained from the post test. After taking the instruction, all sixteen students at the Halloran House Hotel passed the post test. In addition, nine trainees at the Congress Hotel in Chicago, who failed the pretest were able to attain a passing grade on the

post test.

The following conclusions can be made from these outcomes of instruction:

1. Learning occurred from the instruction, the training materials and presentation were valid.
2. Whenever the materials are used, they consistently produced the same results. They are reliable.

Summary

The results of the formative evaluation indicated that the fireguard training materials were appropriate to accomplish the objectives of the instruction program. The field test which included the Halloran House sprinkler presentation was sucessful. All of the trainees who took the certificate of fitness exam passed the examination. Any negative comments of the reaction sheets indicated that the program should be expanded to include all of the employees of the hotel. In both instances of instruction, (Halloran House and Congress), all of the trainees passed the post test after failing the pretest. The designer took this to be an indicator that learning had taken place. Following the instruction classes at both hotels, fire drills were held and all fireguards performed their assigned duties properly.

The results of the summative evaluation provided the

instructor/designer with evidence of the appropriateness of the training for a hotel environment. At all four levels of the summative evaluation, the designer found positive results and they can be summarized as follows:

1. Reaction - the designer did in both instances, at the Hallcrest House Hotel and at the Congress Hotel receive favorable reactions to the instruction.
2. Learning - In both instances of instruction, all trainees passed the post test after failing the pretest.
3. Behavior - During the fire drills following the instructional classes, the new fireguards performed their duties.
4. Results/Impact - The fireguard training did have an impact on both hotel organizations as they were able to :
   - show compliance with local ordances, e.g. New York City and Chicago, Illinois.
   - show a work environment for employees that complies with OSHA regulations for providing a safe, hazard free environment for employees.

Chapter 7

SUMMARY and RECOMMENDATIONS

Introduction

In this phase, the contents of the project described in this project are summarized. In addition to the summary, recommendations will be provided for anyone who may want to extend the design to another area or another group population For example, another designer/instructor may want to provide fireguard training in a health care setting or office building environment. With minor changes, the present fireguard instruction could be applied to these types of settings.

Methods and Procedures Used

In this project, the designer has organized an instructional program to train employees of hotels/motels and public assembly occupancies as fireguards. During the course of development, the fireguard training was designed and field tested at the Halloran House Hotel in New York City. After a sucessful implfmentation and neccessary modifications, the instructional program was delivered at the Congress Hotel in Chicago, Illinois.

In each city, different circumstances and requirements prompted the devlopment of a fireguard training program. In New York City, hotels and public assembly are required to use trained

fireguards. The local laws which mandate their use are:

- Local Law #41 - requires certified fireguards when a public assembly occupancy is open to the public.
- Local Law #16 - requires sprinkler systems to be installed in all existing high rise hotels. In the period before the installation is completed, the employment of fireguards to patrol the building is required.

At the Congress Hotel in Chicago, Illinois, three situations prompted the organization of an in-house fire guard traininmg program. The needs of the hotel were the following:

- In September 1986, a local law was passed requiring a fire alarm system to be installed in all existing hotels/motels. Until the system is installed, trained fireguards are required to patrol the guest room floors. The fireguards are required to record their rounds with an electronic detex system.
- A Front Desk employee on every shift is required to be a certified fireguard.
- Fireguards are required to be on duty whenever a trade show or exhibition is being held at the hotel.

The instructional program for fireguards organizes the subject material into six subject modules which are:

1. classes and types of fires.
2. portable fire extinguishers.
3. sprinkler systems.
4. fire reporting systems
5. fire hazards.
6. life safety hazards.

For the implementation phase of this project, the designer selected module three which is the sprinkler system unit. As previously stated in the project the program was implemented with success at both hotels. The lesson plan for the sprinkler module is included in Appendix D.

Conclusions

After completing the present project, the designer arrived at a number of specific conclusions about fireguard training of employees and fire safety training in general in the private sector. The conclusions are as follows:

1. In general, even though fire safety training is an intangible factor in business it can be cost effective. Cost effectiveness can take the form of reduced insurance liability premiums. This can result in increased profits for the organization.

2. Fireguard training can result in increased employee motivation. This can lead to increased productivity for the hotel and larger profits. For example, fire drills, fire guards, and fire brigades are a highly visible activity in an organization and can be utilized as a motivational tool by managers.
3. When there is an in - house fire safety training program for a hotel organization, management has available a marketing strategy that offers a possibility for increasing sales by focusing on the the concept of increased guest safety.
4. The fireguard program that has been the topic of this project can be used as a stand alone program. However, while it is comprehensive by itself, it can be expanded to include additional modules. For example, a module could be added that concentrates on fire drills in a high rise hotel. Another subject that could be added might be building design features such as compartmentation that adds to building fire safety.
5. The use of audio visual materials, specifically VHS tapes for technical topics can greatly enhance the learning process with students that are not familiar with technical and mechanical types of subject matter. In the case of the present instructional module, facilitating the learning task was made

easier for the instructor by the use of VHS tapes.

6. Because the fireguard training at the Halloran House Hotel has been successful, management is now expanding the in - house training program to include the new OSHA regulations for a safe employee environment. Specifically, this will include the requirements of The OSHA Hazard Communication Standard which deals with chemicals in the work place.

The designer concluded that the employees that have taken the fireguard training gained entry behaviors that normally they would not have had. For example, in the training they were introduced to the concepts of gases, hazardous material storage, and personal protection against these substances.

- Recommendations

The designer would like to suggest that the fireguard training program of this thesis project can be used for fire safety training of employees in other environments. Three environments in which the program could be implemented in could include the following types of occupancies:

- High - Rise office buildings
- Health care environments
- Mercantile occupancies in atrium structures

With some minor modifications or the addition of subject material the instructional program can be implemented in these environments. All three of the named occupancies have the common characteristic of large groups of people. Like hotels, the people found in these occupancy groups are unfamiliar with their surroundings and may need the assistance of building employees if the evacuation of the building space becomes necessary. Building owners or corporations that occupy these structures can benefit from the same results that were obtained by instituting the training program in both of the hotels during this project. The beneficial results include the following:

1. Instituting the program could result in reduced fire insurance premiums.
2. Productivity can be increased by a higher level of employee motivation with the result of increased organizational profits.
3. The use of trained employees can result in more organized and effective fire drills.
4. The training program would facilitate compliance with OSHA regulations for safe employee environments
5. There are audio/visual tapes and slide shows that are commercially available and focus on these specific occupancies. Like the Halloran House Hotel and Congress Hotel, the use of these materials would facilitate

learning by the students and the instructor would have an easier task of delivering the training. Because the hotel fireguard applicants usually will not have the entry level technical skills the commercially prepared media can save training time.

The subject content of the recommended fireguard training modules would be the same as the present project. Depending on the type of occupancy in which the program is being implemented, the focus of the subject can change. For example, in a health care setting the evacuation focus would be on horizontal movement of people as opposed to vertical movement in a high rise hotel or office building. Another example is a mercantile occupancy in which more emphasis could be extended to fire hazard and storage problems. Any differences and adjustment can be accomplished by the use of formative evaluation procedures as was done with the training at the hotels during this project.

Concluding Statement

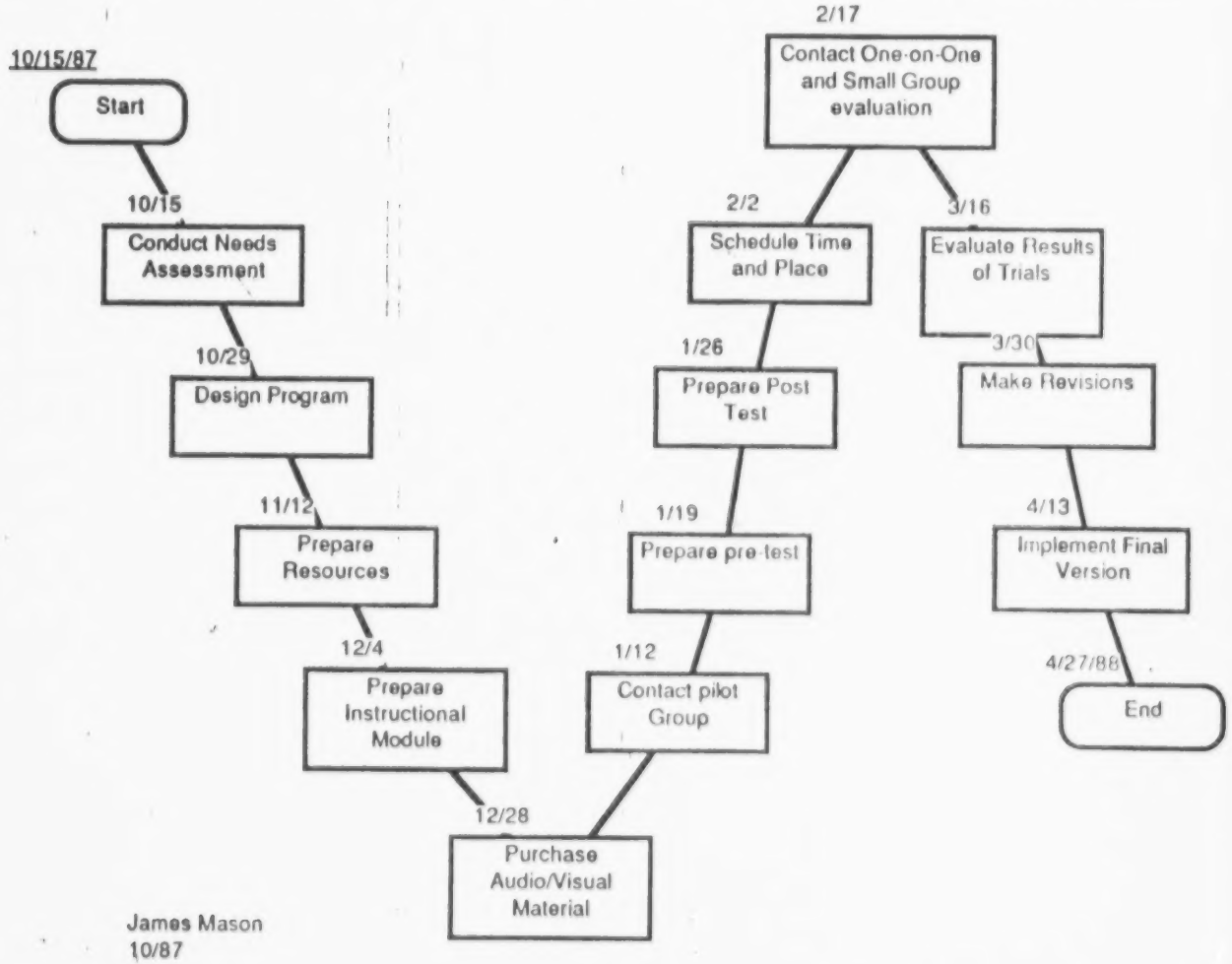
As the designer of the present thesis/project, it is my hope that the instructional fireguard training program described can be used as a guide for developing future training programs. As the literature review in the early stages of the project revealed, there is a need for more training programs

APPENDIX A

Project Planning

		Weeks	Start	Finish
1.	Start	0	10/17/87	5/4/88
2.	Needs Assessment	2	10/18/87	11/1/87
3.	Design Program	2	11/1/87	11/15/87
4.	Prepare Resources	3	11/15/87	12/8/87
5.	Prepare Instructional Module	3	12/2/87	12/23/87
6.	Purchse Audio/Visual Material	2	12/23/87	1/15/88
7.	Contact Pilot Group	1	1/15/88	1/22/88
8.	Prepare Pretest	1	1/22/88	1/30/88
9.	Prepare Post Test	1	1/30/88	2/7/88
10.	Schedule Time and Place	2	2/7/88	2/21/88
11.	Contact one - on - one and small group evaluation	4	2/21/88	3/21/88
12.	Evaluate Results of Trials	2	3/21/88	4/5/88
13.	Make Revisions	2	4/5/88	4/19/88
14.	Implement at Sites	2	4/19/88	5/4/88
15.	End	0		

Fireguard Training Project Development Plan



James Mason
10/87

Fireguard Training Project Development Plan

	Task Name	Weeks	Earliest Start	Earliest Finish	Latest Start	Latest Finish	Fixed Cost	Resource Cost
1	Start	0	10/15/87	10/15/87	10/15/87	10/15/87	0	0
2	Conduct Needs Assessment	2	10/15/87	10/29/87	10/15/87	10/29/87	0	120
3	Design Program	2	10/29/87	11/12/87	10/29/87	11/12/87	0	120
4	Prepare Resources	3	11/12/87	12/4/87	11/12/87	12/4/87	0	180
5	Prepare Instructional	3	12/4/87	12/28/87	12/4/87	12/28/87	0	180
6	Purchase Audio/Visual	2	12/28/87	1/12/88	12/28/87	1/12/88	300	120
7	Contact pilot Group	1	1/12/88	1/19/88	1/12/88	1/19/88	0	60
8	Prepare pre-test	1	1/19/88	1/26/88	1/19/88	1/26/88	0	60
9	Prepare Post Test	1	1/26/88	2/2/88	1/26/88	2/2/88	0	60
10	Schedule Time and Place	2	2/2/88	2/17/88	2/2/88	2/17/88	0	120
11	Contact One-on-One and	4	2/17/88	3/16/88	2/17/88	3/16/88	0	240
12	Evaluate Results of Trials	2	3/16/88	3/30/88	3/16/88	3/30/88	0	120
13	Make Revisions	2	3/30/88	4/13/88	3/30/88	4/13/88	0	120
14	Implement Final Version	2	4/13/88	4/27/88	4/13/88	4/27/88	1600	120
15	End	0	4/27/88	4/27/88	4/27/88	4/27/88	0	0

APPENDIX B.

Instructional Task Analysis

To accomplish the instructional task analysis, it will be necessary to conduct a survey of the sprinkler system that is installed in the specific building and its related occupancies. For example, in a large high rise hotel building there would be not only the main sprinkler system to consider, but also any other occupancies of the structure that require special applications of the system. Such applications could include special sprinkler head types that must be included in the instruction.

After conducting the building survey and determining if all of the subject content has been included, the next stage is to review the fire safety plan. The plan should contain all of the technical data of the sprinkler system. Included in the plan would be locations of sprinkler components, and the procedures to be followed when a sprinkler head is activated. The data that is found in the fire safety plan should match and be related to the information that was compiled in the building survey.

APPENDIX C.

GUIDELINES for APPLICANTS PREPARING FOR THE EXAMINATION OF:

PUBLIC ASSEMBLY FIREGUARD and FIRE DRILL CONDUCTOR

LOCAL LAW #41

INSPECTIONAL GUIDE CHECK LIST

1. Know the location of the street fire alarm boxes nearest to the front, side, and rear of the premises for the immediate transmission of alarms for fire or emergency.
2. Inspect all emergency exits, stairways, courts, and passageways to determine condition and availability for use in compliance with the law.
3. Examine all automatic fire doors to determine operative condition and availability for use.
4. Inspect all portions of Standpipe and Sprinkler Systems, including pumps and tanks. Also, the fire appliances to determine their condition and readiness for immediate use.
5. Report unserviceable Standpipe and Sprinkler Systems to the officer of the nearest firehouse in the district that the premises is located.
6. In theatres, examine the automatic skylight, to determine operative condition and readiness for use.
7. Inspect all parts of the premises incuding the backstage and under raised platforms for accumulations of rubbish and maintain free of same at all times.

8. In theatres require that all doors in the proscenium wall be kept closed during the performance.
9. in theatres, prohibit smoking in all unauthorized areas.
10. Require necessary extinguishers to be readily available and fully charged at all times.
    Also, extra extinguishers of the proper type to be available whenever materials of a hazardous nature are being used.
11. Require all fire department permits to be obtained and kept current, and be available for Fire Department inspection.
12. The Designated Fire Guard is to be prepared to take a position in front of the audience to prevent any undue excitement or possible panic conditions in the event of an emergency.
13. The Fire DEparment requires that each Place of Assembly maintain a daily log book, noting the results of inspections and any violations that have been noted. This log book is to be readily available at all times for inspection by members of the Fire Department.

DUTIES of PUBLIC ASSEMBLY FIREGUARDS

Fire Department service to Places of Assembly are available for both routine non-alarms and emergency assistance.

When a fire or emergency occurs it should be attended to immediately and there must be no delay in transmission of the notification to the Fire Department. Once an alarm is turned in from a street alarm box, remain at the box to direct the incoming units to the location of the fire or emergency.

To call the Fire Department, simply pick up the receiver and DIAL OPERATOR. Then, tell her that this is an emergency, give her your number and the location of the fire or emergency. Telephone Numbers of the Fire Department Borough Offices are:

MANHATTAN	628 - 2900	QUEENS	847 - 6600
BRONX	665 - 2200	STATEN ISLAND	727 - 1100
BROOKLYN	636 - 1700		

- It shall be the duty of the Fire Guard upon having inspected equipment, to report all unserviceable Standpipe or Sprinkler Systems immediately to the Fire Department.

Violations which are brought to the attention of the management shall be corrected immediately or within the time specified by the inspecting Fire Officer.

It is important to recognize the different types of fire and to utilize the proper fire extinguisher to contain small fires before they get out of hand. There are three classes of fire and specific extinguishers are recommended to combat each type effectively.

CLASS A FIRES: occur in ordinary combustible materials, and are best extinguished with water type extinguishers with a quenching and cooling effect on the fire.

CLASS B FIRES: occur in flammable liquids and greases and require smothering rather than cooling and quenching. Carbon Dioxide (CO2), Dry Chemical, or Foam extinguishers are recommended for these type of fires.

CLASS C FIRES: occur in live electrical equipment and require an extinguishing agent that will not conduct electricity. Carbon Dioxide or Dry Chemical extinguishers are recommended for these types of fires.

Management must be aware of its responsibility to provide safe Places of Assembly to its patrons. Good housekeeping is a relatively cost-free practice of insuring the safety of lives and property. Good housekeeping throughout the premises is vital. This means waste must not be permitted to accumulate, and must be promptly disposed of. Further, combustible cleaning agents, paints, etc. must be stored in a safe area, free from heat, and other sources of ignition. Without flammable material there can be no fire.

The two most common causes of fires are Cigarettes and Matches, and defective electrical equipment. In Places of Assembly where smoking is permitted, there must be sufficient ashtrays of the proper type provided. In these areas, decorative draperies and wall hangings must be fire retarded, as well as floor and wall coverings. This is only acceptable to the Fire Deparment if it done by a reputable Flameproofing Company. They are required to provide an affidavit certifying the flameproof qualities. A copy of this affidavit must be provided to the Fire Department, and a copy retained at the premises, to be available for Fire Department Inspectors. In Theatres, there is no smoking at any time within the Theatre.

In Motion Picture Theatres smoking is permitted in designated areas approved by the Fire Department.

Lighting and electrical equipment are important factors in the Public Assembly Industry. All installations must be in accordance with the New York City Electrical Code. Ordinary artificial lighting can be a hazard. Lamps readily become hot enough to ignite ordinary combustible materials. For that reason, lamps, and portable lighting should be provided with adequate guards over the bulbs. One must be on guard for frayed and loose wiring. They should be replaced by a knowledgeable person upon detection of the slightest defect. Flexible cords

and loose wiring should never be used as a substitute for permanent wiring.

No firefighting equipment can be effective without adequate manpower properly trained to operate it. During a fire it is too late and impractical to read instructions on a fire extinguisher. The time to build up an organization to fight fires is before they occur. Give your employees training in the method of using the various types of fire extinguishers available, existing procedures, and the practice of maintaining good housekeeping. This is best done by the Licensed Fire Drill Conductor that is now required in Places of Assembly. Monthly Fire Drills by employees are now required to be conducted and Log Books recording the drill are to be maintained for Fire Department Inspectors. Panic thrives on confusion. If employees are well trained and knowledgeable you will have gone a long way in avoiding panic should an emergency occur in the premises.

Although patrons are not required to participate in the drills, it is important to recognize two classes of patrons that are to be protected.

1. Regular Patrons: the problem is simplified by reason that they are more familiar with the means of egress.
2. General Public: training should be provided in the prevention of panic, rather than the futile attempts at regulating a

panic stricken crowd. Well defined plans will materially assist house employees in directing the movement of an audience that is not familiar with the egress facilities.

Upon the receipt of an alarm for fire or emergency, the manager or person in charge should immediately cause all house lights to be turned on, and an announcement made to reduce the fears of the audience.

Fire Department Requirements

Interior Alarm System

1. Fire Alarm Pull Station must be located in the path of exit.
2. There must be at least one Pull Station on each floor.
3. The Fire Alarm System must be tested Daily, and a record maintained by a person holding a Certificate of Fitness issued by the Fire Department.

Sprinkler System

1. The main control valve (OSY Valve) must be in the open position and sealed with a padlock and chain.
2. The Sprinkler System must be inspected monthly by a competent person holding a Certificate of Fitness issued by the Fire Department. The inspection will determine that all components, and connections if any, are in good working order. A detailed log book recording the results of the inspection is to be

maintained for examination by Fire Department Inspectors.

3. A supply of six (6) extra sprinkler heads and a wrench shall be maintained at all times, located near the Main Control Valve (OSY Valve).

Exits

1. Required to be maintained open and unobstructed at all times while the premises is open to the public.

2. Ailses and passageways must be a minimum of three (3) feet and open and unobstructed at all times when the premises is open to the public.

3. Exit and Directional signs are to be posted in accordance with Fire Prevention Directive 4-79, (Local Law # 41).

4. Doors equiped with Panic Bars to have no other hardware, (sliding bolts, locking devices, etc.), other than the panic bar and its associated hardware.

Emergency Lighting

Emergency Lighting is to be installed in accordance with Fire Prevention Directive 4-79.

Guidelines and Information for the Examination

Hotel Fire Guard

1. Inspectional Guide Check List

    1. Know the locations of the interior fire alarm boxes on all floors to which you are assigned by the owner. Also, know how to operate the box.
    2. Inspect all exits, stairways, and hallways to determine condition and availability for use.
    3. Examine all doors to determine operative condition and availability for use.
    4. Ensure that self-closing doors are unobstructed and require them to be kept closed.
    5. Continuously inspect premises for accumulations of rubbish.
    6. Determine the locations of fire extinguishers and their availability for use. Also, know how to use them.
    7. Report any noticeable fire or life hazards.
    8. Ensure that Exits are properly identified and that hallways, stairways, etc. are properly lighted.
    9. Ascertain that re-entry from stairways is maintained on every floor.
    10. Familiarize yourself with any existing specialized conditions at the premises, such as linen closets,

laundry rooms, rubbish chutes, etc.

11. Test Walkie-Talkie and Bull Horn prior to the start of tour of duty. Report defective or inoperative equipment for immediate repair.
12. Inspect hallways and stairways for merchandise and other obstructions restricting the means of egress.
13. Know the locations of all exits and where they lead to.

Duties of the Fire Guard:

1. When a fire occurs there must be no delay in sounding the interior fire alarm and making notification over the Walkie-Talkie.
2. On discovering a fire, the following actions must be taken:
   a. Sound the alarm.
   b. Report the fire over the Walkie-Talkie to the designated person you were informed to report to. Be sure to receive an acknowledgement of your message.
   c. Proceed to alert all occupants on the fire floor and the floor above.
   d. Direct occupants to evacuate by the safest route, (stairway).
3. Evacuate the fire floor and the floor above.
4. Use the Bull Horn to alert the occupants about the fire

situation.

5. Participate in Fire Drill exercises.
6. During evacuation, instruct occupants not to use the elevators.
7. During patrol, remain in designated areas.
8. Report all items of violation to the designated person in charge.
9. Request of the person in charge to show you how to use available fire extinguishers, alarm systems, walkie-talkies, bull horns, etc.

111 General Information

1. Fire guards must be on duty 24 hours a day.
2. A certfied fire guard with a walkie-talkie and bull-horn is required for each seventy (75) feet or fraction thereof in height of the building.
3. It is important to recognize the different types of fire and to utilize the proper fire extinguishers to contain small fires before they get out of hand. There are three classes of fire and specific extinguishers are recommended to combat each type effectively.

CLASS A FIRES: occur in ordinary combustible materials and are extinguished with water extinguishers with a quenching and cooling effect.

CLASS B FIRES: occur in flammable liquids and greases and require smothering rather than quenching. Carbon dioxide (Co2), and Dry Chemical extinguishers are recommended for these types of fires.

CLASS C FIRES: occur in live electrical equipment and require an extinguishing agent that will not conduct electricity. Carbon dioxide or Dry Chemical extinguishers are recommended for these types of fires.

4. Management must provide a log book for recording the tour hours and the reports of fire guards.
5. Fire guards must be given clear instructions by management indicating the authorized person to whom fire hazards and fire emergencies must be immediately reported.
6. Frayed and loose electrical wiring must be remedied immediately by a qualified person after being reported by fire guards.
7. Maintain exits unlocked and unobstructed at all times.
8. Doors equipped with panic hardware to have no other hardware, sliding bolts, or locking devices, other than those devices interconnected with the panic hardware.

APPENDIX D.

Lesson Plan Summary

Lesson Title - Sprinkler Systems

Clock Time Required - 30 Minutes

Type of Lesson : Cognitive

Objectives :

After the training the student will be able to differentiate between a wet and a dry pipe system, and describe how a sprinkler head activates. The trainee will know what the function of a Fire Department connection is, the different types of shut off valves used in sprinkler systems and know the methods of supplying water to a sprinkler system. Included in the instruction are the proper inspection procedures for sprinkler systems.

Audio/Visual Equipment Needs:

- Overhead Projector
- VHS Recorder
- Television
- Screen
- Electrical Extension Cords

Audio/Visual Materials:

- IFSTA 200 Overhead Transparencies, "Sprinklers"
- IFSTA, VHS Firefighter 1 Series, "Sprinklers"
- IFSTA, VHS Firefighter 11/111 Series,"Inspection and Testing Sprinkler Systems"

Step	Clock Time	Main Point	Method
Motivation	5Min.	-Describe Sprk System operation and how they protect lives.	Lecture-Transparency
Presentation	20Min.	- Describe Sprk. Heads - Describe Wet and Dry systems - Describe F.D. connections and their function - Describe Sprk.System shut off valves	Lecture Transparency Sprinkler heads
Application	15 Min 20 Min.	- Present VHS Tape "Sprk. Systems" - Present VHS Tape "Insp. and Testing Sprk. Sys." - Describe Inspection procedures for Sprk. Sys. - Fire Department Regs. for Sprk. Systems	VHS Tapes
Evaluation	15 Min.	- Adminster Post Test - Adminster Reaction Sheet	
Conclusion	20 Min.	- Review Sprinkler Systems. Wet & Dry Systems - Review Sprk. Head types - Review F.D. Connections - Inspection procedures, documentation, and action taken when a hazard is found.	

APPENDIX E

Pretest

Short Answer Questions:

1. The OSY valve is located where in the sprinkler system?

2. What activates a sprinkler head?

3. A standard sprinkler head fuses at what temperature?

4. An OSY valve is what type of?

5. What is the purpose of the fire department connection?

True or False

6. A water motor gong is located inside of a building?

7. An OSY valve is required to be chained open?

8. The manager on duty would be notified in the event a sprinkler head is found closed?

9. There are two types of sprinkler systems, Wet and Dry?

10. Sidewall, Upright, and Pendant describe what types of sprinkler heads?

Answers For Pretest

1. in the front or beginning of the system.
2. heat.
3. between 135 and 175 degrees Farenheit.
4. indicating type.
5. supply water, and augment pressure to the system.
6. True.
7. True
8. True.
9. True.
10. True

Post - test

True or False

1. A motor gong alarm is a water flow alarm?

2. In auto - wet systems, sprinkler heads are usually of the fusible link type?

3. An OSY valve is an indicating type valve?

4. Sprinkler systems can be monitored by a central station for water flow?

5. Main shut off valves (OSY) are required to be locked and chained open?

Circle the correct answer

6. A sprinkler system is required to be tested:

   (daily) (yearly) (monthly) (Semi - annually)

7. Fire department connections of sprinkler systems are:

   (red) (green) (brass) (yellow)

8. Sprinkler heads should always be:

   (kept clear) (painted) (inspected) (covered)

9. If a sprinkler system is out of service, who should be notified?

(Fire Department) Mgr. on Duty) (other fireguards)

(all of the above)

10. Pendant, upright, sidewall, are used to describe what?

(sprinkler heads) (main valve) (F.D. connection)

(alarm valve)

Post Test Answers

1. True
2. True
3. True
4. True
5. True
6. Yearly
7. Green
8. Kept clear
9. All of the above
10. Sprinkler heads

APPENDIX F

Please give your frank reactions and comments. They will help in evaluating this program for possible improvement in the future.

1. How do you rate the subject content ?

   [ ] Excellent [ ] Very Good [ ] Good [ ] Fair [ ] Poor

2. How do you rate the instructor ?

   [ ] Excellent [ ] Very Good [ ] Good [ ] Fair [ ] Poor

3. What benefits do you feel you got from this session ?

   [ ] New knowledge that is pertinent.

   [ ] Specific approaches, skills, or techniques that are applicable on the job.

   [ ] Change of attitude that will help me in my-job.

   [ ] Other, please specify.

4. What would make this session better ? (Use other side if necessary).

APPENDIX G

Sprinkler Module

Halloran House Pretest

Seventy Five Percent was the passing grade

N = 16

Trainee Number:

# 1 - 20%	# 9 - 50%
# 2 - 60%	# 10 - 50%
# 3 - 50%	# 11 - 60%
# 4 - 30%	# 12 - 40%
# 5 - 30%	# 13 - 20%
# 6 - 40%	**# 14 - 50%**
# 7 - 60%	# 15 - 50%
# 8 - 40%	# 16 - 40%

Questions answered right or wrong

Question number	Correct	Wrong
# 1	0	16
# 2	15	1
# 3	1	15
# 4	3	13
# 5	3	13
# 6	7	9
# 7	5	13
# 8	13	3
# 9	8	8
# 10	12	4

Sprinkler Module

Halloran House Post Test

Halloran House Post Test

The post test consisted of ten questions. Five of the questions were of the true or false type and five were of the multiple choice type.

Seventy Five Percent was the passing grade

N = 16

Trainee Number:

# 1 - 80%	# 9 - 75%
# 2 - 80%	# 10 - 80%
# 3 - 100%	# 11 - 90%
# 4 - 70%	# 12 - 100%
# 5 - 100%	# 13 - 70%
# 6 - 75%	# 14 - 80%
# 7 - 90%	# 15 - 80%
# 8 - 75%	# 16 - 80%

Questions answered right or wrong

Question number	-	Correct	-	Wrong
# 1	-	13	-	3
# 2	-	16	-	0
# 3	-	15	-	1
# 4	-	12	-	4
# 5	-	15	-	1
# 6	-	9	-	7
# 7	-	8	-	8
# 8	-	14	-	2
# 9	-	10	-	6
# 10	-	15	-	1

Sprinkler Module

Congress Hotel Pretest

Congress Hotel Pretest

The test questions were the same as those given at the Halloran House class. The passing grade was also seventy-five percent.

N = 9

Trainee number:

# 1	-	60%	# 6	-	30%
# 2	-	40%	# 7	-	50%
# 3	-	40%	# 8	-	60%
# 4	-	60%	# 9	-	60%
# 5	-	10%			

Questions answered right or wrong

Question number	-	Correct	-	Wrong
# 1	-	2	-	7
# 2	-	8	-	1
# 3	-	3	-	6
# 4	-	1	-	8
# 5	-	3	-	6
# 6	-	2	-	7
# 7	-	5	-	4
# 8	-	7	-	2
# 9	-	5	-	4
# 10	-	8	-	1

Sprinkler Module

Congress Hotel Post Test

Congress Hotel Post Test

The test and questions were the same as given in the Halloran House exam. A passing grade of seventy five percent was required.

N = 9

Trainee number:

# 1	-	80%	# 6	-	75%
# 2	-	80%	# 7	-	80%
# 3	-	90%	# 8	-	90%
# 4	-	80%	# 9	-	90%
# 5	-	75%			

Questions answered right or wrong

Question number	-	Correct	-	Wrong
# 1	-	9	-	0
# 2	-	7	-	2
# 3	-	9	-	1
# 4	-	8	-	1
# 5	-	9	-	0
# 6	-	7	-	2
# 7	-	9	-	0
# 8	-	8	-	1
# 9	-	9	-	0
# 10	-	8	-	1

APPENDIX H

VALUE OF AUTOMATIC SPRINKLER SYSTEMS

- Most Reliable of all Fire Protection Devices
- Rarely Fail to Operate
- 96% of Fires in Sprinklered Buildings are Extinguished or Controlled
- Enhance Life Safety
- Reduction in Insurance Costs

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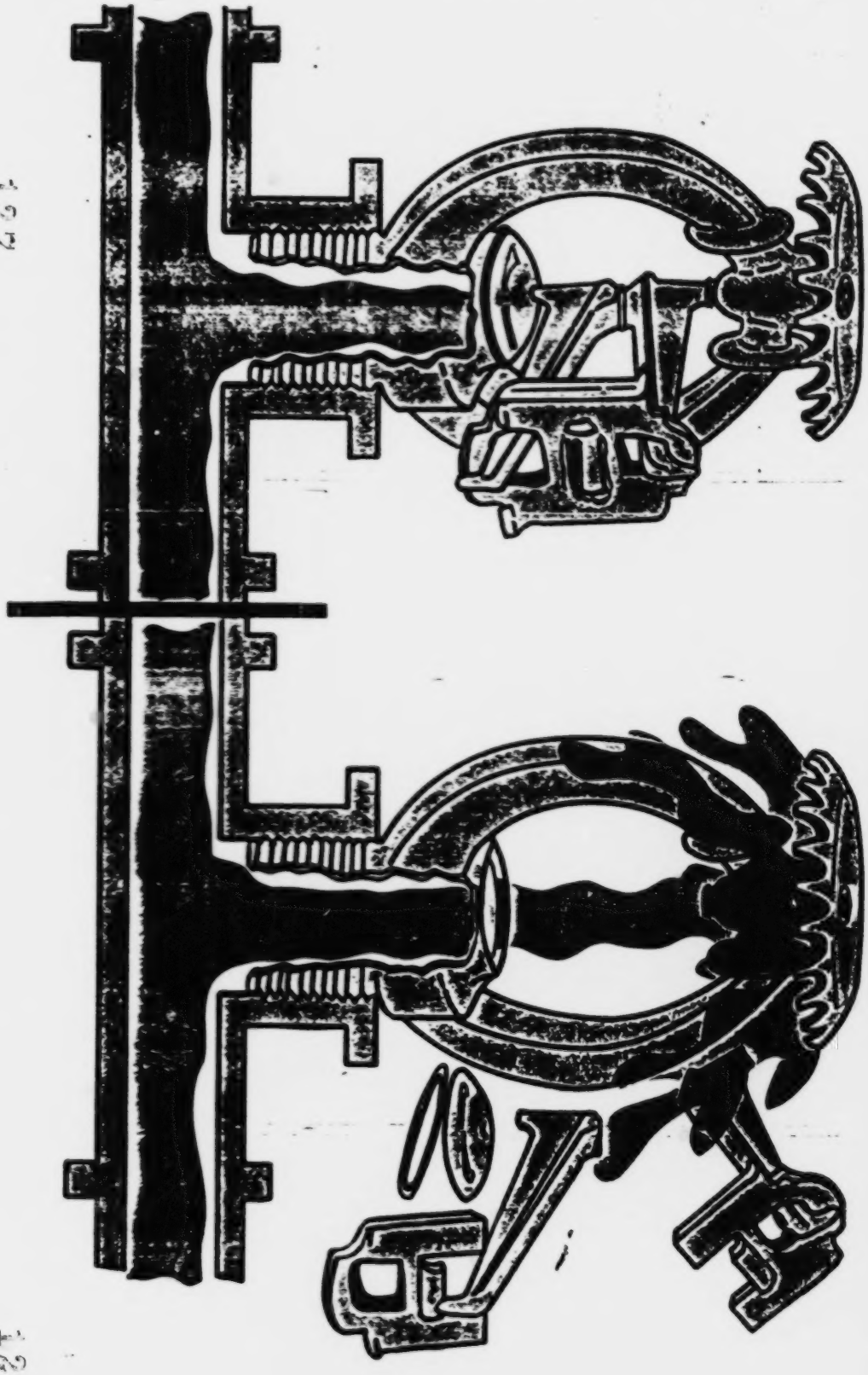

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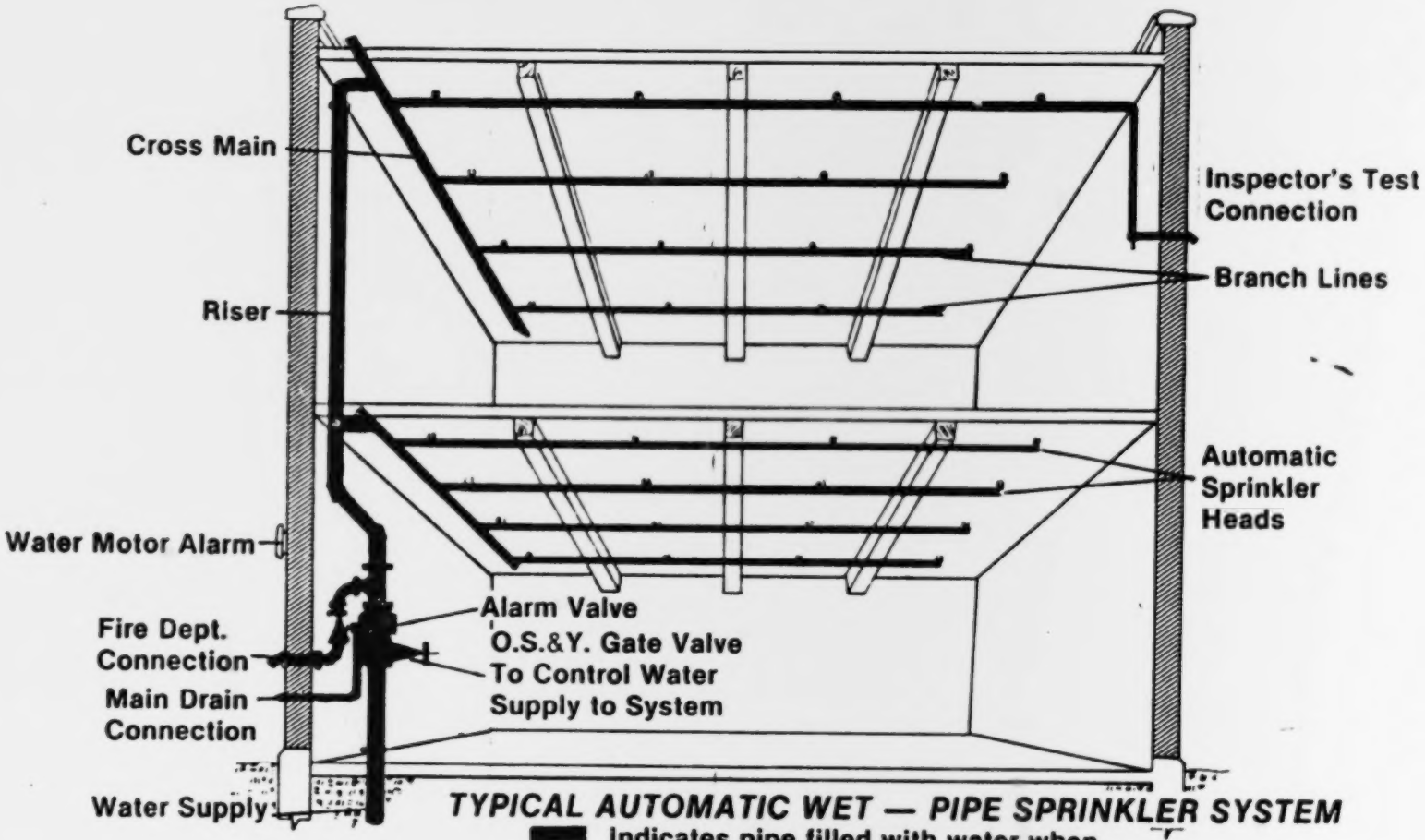

TYPICAL AUTOMATIC WET — PIPE SPRINKLER SYSTEM

Indicates pipe filled with water when system is set for service

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TYPES OF SYSTEMS - DRY

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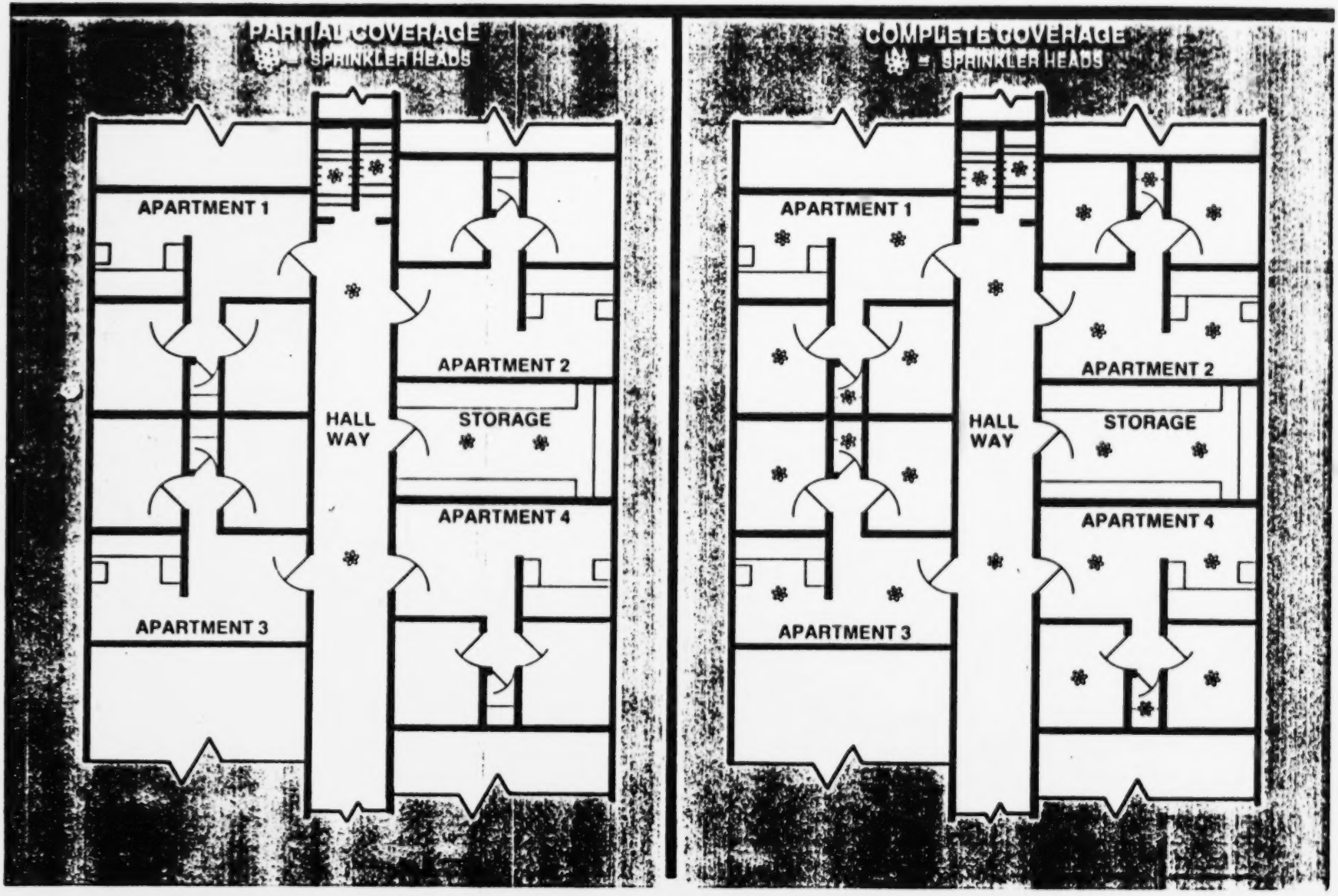
COMPLETE VERSUS PARTIAL COVERAGE



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SPRINKLER SYSTEM WATER SUPPLIES

- Public Water System
- Gravity Tank
- Pressure Tanks
- Fire Pumps from Private Storage
- Fire Department Connection

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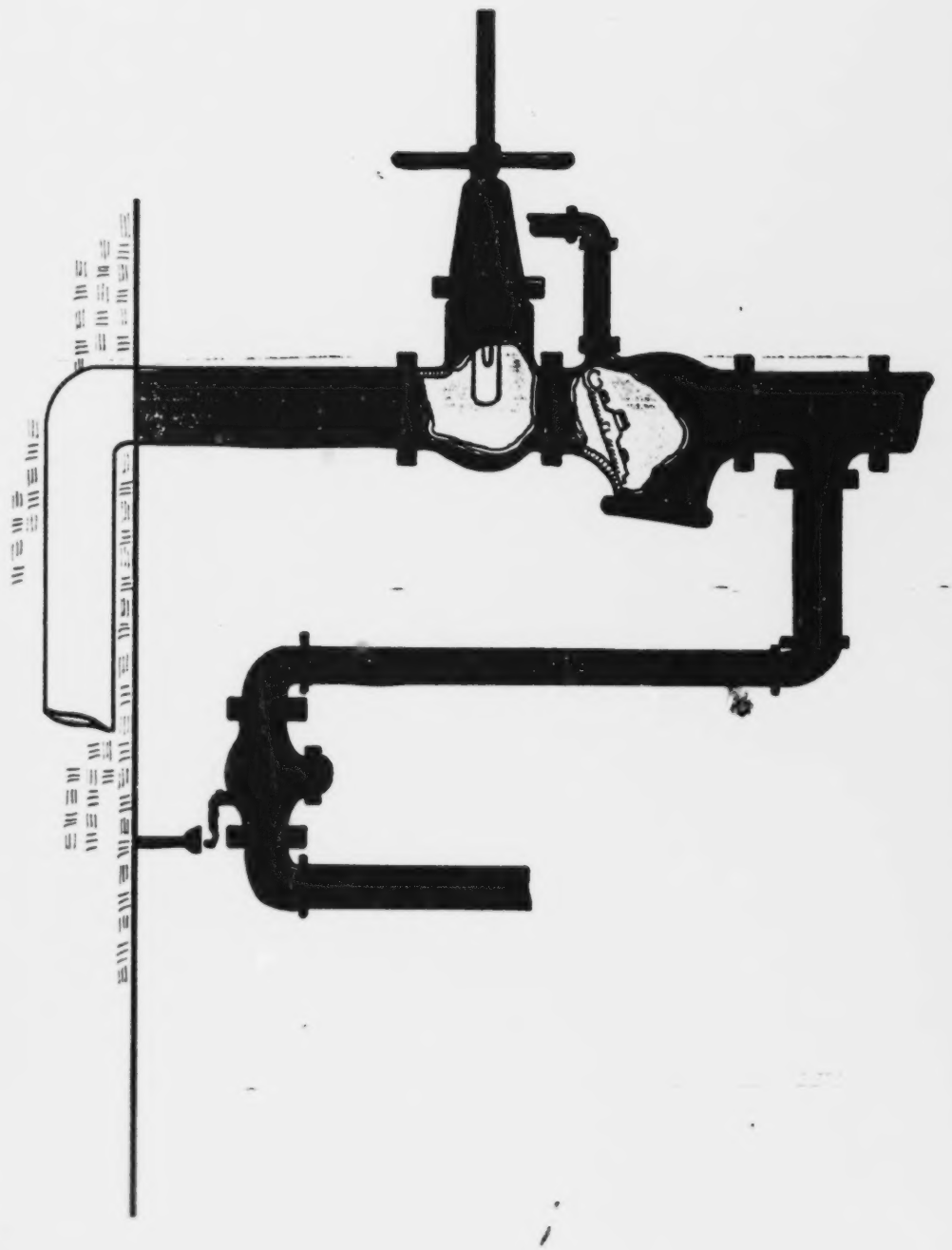

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DANGERS OF PREMATURE CLOSING OF MAIN CONTROL VALVE

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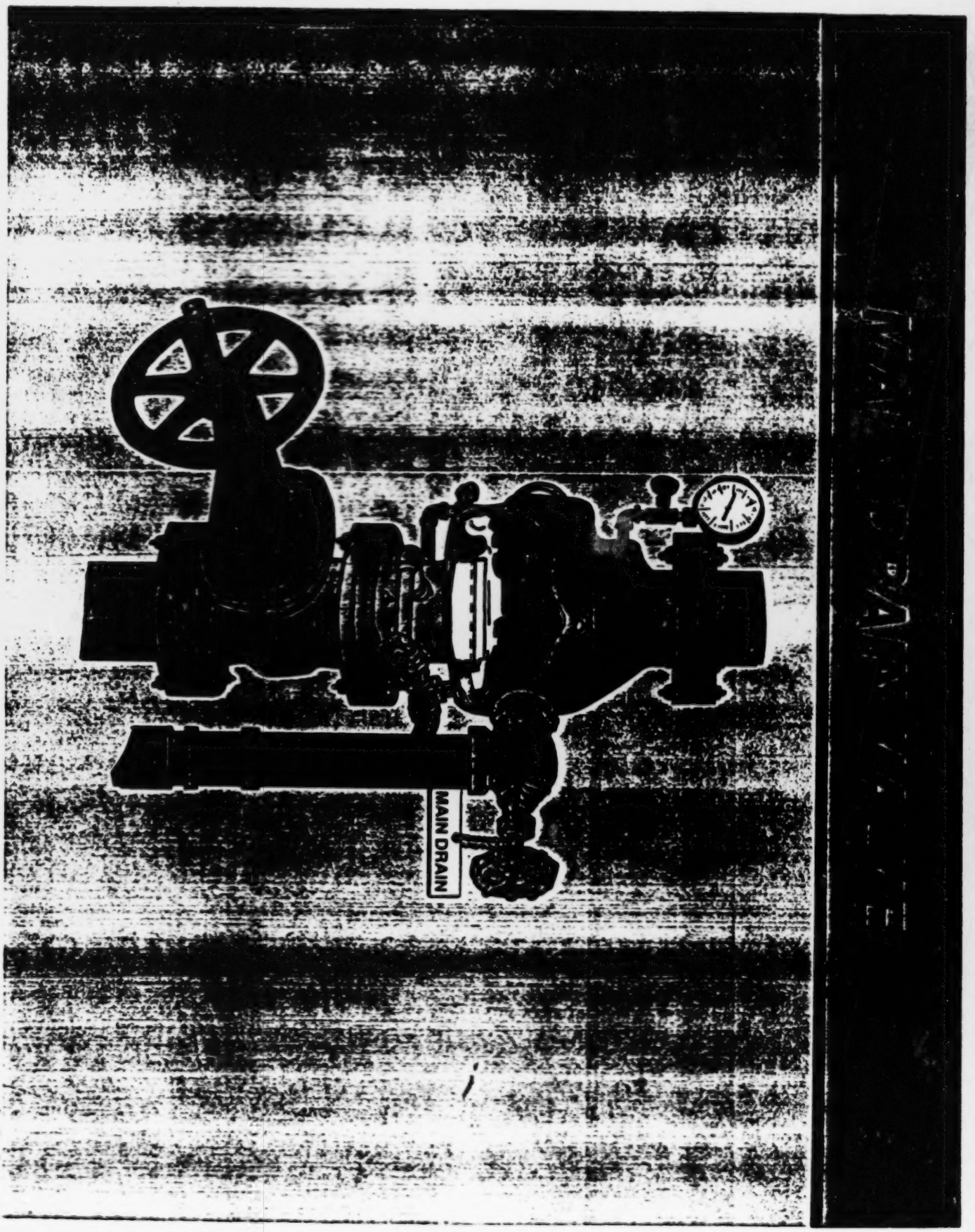

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Ifsta 200-Essentials of Fire Fighting

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STOPPING A SPRINKLER

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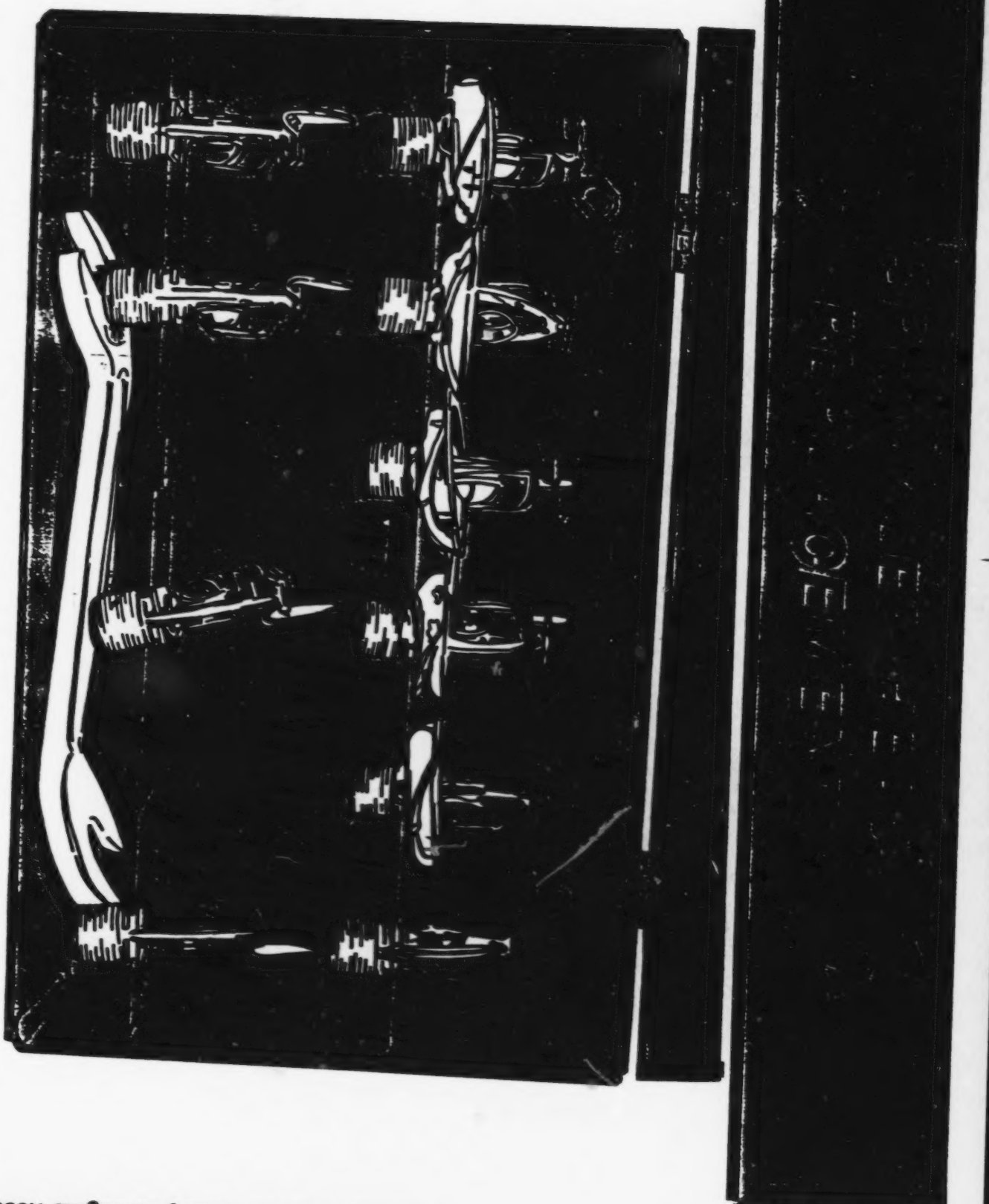

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